MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

FTA GRANT NO. MA-03-0227
BLUE LINE MODERNIZATION PROJECT

CONTRACT SPECIFICATIONS
for
MBTA Contract No. S10CN04

Volume 1 of 2

Blue Line Modernization Project
Maverick Square Station
and Blue Line Vents
East Boston, Massachusetts

September, 2004

CONFORMED COPY

PROJECT MANAGER'S COPY

DMJM+HARRIS, Inc.
66 Long Wharf
Boston, Massachusetts

&

Parsons Brinkerhoff Quade & Douglas, Inc.
75 Arlington Street
Boston, Massachusetts

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

FTA GRANT NO. MA-03-0227
BLUE LINE MODERNIZATION PROJECT

BID FORM

MBTA CONTRACT NO. S10CN04

BLUE LINE MODERNIZATION PROJECT
MAVERICK SQUARE STATION
AND BLUE LINE VENTS

EAST BOSTON, MASSACHUSETTS

September, 2004

COPY NO. 2

DMJM+HARRIS, Inc.
66 Long Wharf
Boston, Massachusetts

&

Parsons Brinkerhoff Quade & Douglas, Inc.
75 Arlington Street
Boston, Massachusetts

RECEIVED OCT 25 2004

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

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Michael H. Mulhern

ASSISTANT GENERAL MANAGER FOR DESIGN AND CONSTRUCTION

David W. Ryan

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
TRANSPORTATION BUILDING
10 PARK PLAZA
BOSTON, MASSACHUSETTS 02116-3975

NOTICE TO BIDDERS

Sealed bids for MBTA Contract No. **S10CN04, BLUE LINE MODERNIZATION PROJECT, MAVERICK SQUARE STATION and BLUE LINE VENTS, (CLASS 1 - GENERAL TRANSIT CONSTRUCTION, PROJECT VALUE - $45,000,000.00)**, will be received by the Director of Contract Administration, at the Contract Administration Office, 5th Floor, Room 5610, Transportation Building, 10 Park Plaza, Boston, Massachusetts, 02116-3975, until two o'clock (2:00 p.m.) on ~~November 16, 2004~~ December 1, 2004 March 3, 2005. Immediately thereafter, in a designated room, the Bids will be opened and read publicly.

Work consists of: renovations to existing Maverick Square Station on the Blue Line and upgrades to the emergency tunnel ventilation and unit substation B2. Renovations to Maverick Square Station include new headhouses, renovation of platforms, new elevators, new stairs, new landscaping, and new finishes.

This Contract is subject to a financial assistance Contract between the MBTA and the Federal Transit Administration of U.S. Department of Transportation. FTA Participation **80 percent.**

Each prospective bidder proposing to bid on this project must be prequalified in accordance with the Authority's "Procedures Governing Classification and Rating of Prospective Bidders." Copies may be obtained from the Contract Administration Office at the above address. Requests for prequalification for this Project will not be accepted by the Authority after the tenth (10th) day preceding the date set for the opening of bids.

Prequalified bidders may obtain from the Contract Administration Office a "Request for Bid Form" which must be properly filled out and submitted for approval.

Bidding documents may be obtained from the Contract Administration Office at the address above from 8:30 a.m. to 4:00 p.m., on **October 15, 2004**, Monday through Friday, at a charge of **$300.00** per copy. The Authority's STANDARD SPECIFICATIONS, BIDDING AND CONTRACT REQUIREMENTS AND DIVISION 1 - GENERAL REQUIREMENTS dated November, 1983, is available at a charge of $5.00 per copy. Authority's STANDARD SPECIFICATION, CONSTRUCTION, dated January 1980, is available at a charge of $15.00 per copy. Bidding documents will be sent upon request and receipt of an additional fee of $15.00, payable by separate check. Bidding documents will be forwarded by AirFreight, where such service is available, at the expense of the plan holder. NONE OF THESE CHARGES ARE REFUNDABLE.

Bidders attention is directed to Appendix 1, Notice of Requirement for Affirmative Action to Insure Equal Employment Opportunity; and to Appendix 2, Supplemental Equal Employment Opportunity, Anti-Discrimination, and Affirmative Action Program in the specifications. In addition, pursuant to the requirements of Appendix 3, Disadvantaged Business Enterprise (DBE) Participation Provision, Bidders must submit an assurance with their Bids that they will make sufficient and reasonable efforts to meet the stated DBE goal of 17 **percent.**

Bidders will affirmatively ensure that in regard to any contract entered into pursuant to this solicitation, minority and female construction contractors will be afforded full opportunity to submit Bids and will not be discriminated against on the grounds of race, color, religion, sex, age, or national origin in consideration for an award.

Bidders will be required to comply with Federal Equal Employment Opportunity Regulations and the President's Executive Order No. 11246 and any amendments or supplements thereto.

Authorization for the Bidders to view the site of the work on the MBTA's property shall be obtained from the Project Manager, George Doherty, MBTA Design and Construction, 500 Arborway, Jamaica Plain, MA 02130, telephone (617) 222-3081. The Authority will conduct an inspection tour of the site on **October 27, 2004.** Bidders are requested to be present at Maverick Square, in front of the Headhouse, East Boston, Massachusetts, at **10:00 a.m.** to participate in the tour. Bidders are advised that they should have representation at this tour as no extra visits are planned.

A prebid conference will be held on **October 27, 2004** at **2:00 p.m.** at MBTA Design and Construction, 500 Arborway, Jamaica Plain, in the Conference Room No. 1. Any request for interpretation of the Plans and Specifications should be submitted in writing at the same time.

Bidders will be required to certify as part of their bids that they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

This Contract is subject to Federal wage and hourly laws and minimum State wage rates as well as all other applicable labor laws.

Bidders are advised that the "Buy America" provisions of the Surface Transportation Assistance Act of 1982 (Pub. L-97-424) as amended, apply to any Contract, procurement or agreement which results from this solicitation.

Bid Guaranty shall consist of a bid deposit in the amount of five (5) percent of the value of the bid, in the form of a bid bond, cash, certified check, treasurer's or cashier's check.

The successful Bidder shall be required to furnish a Performance Bond and a Labor and Materials Payment Bond each for the full amount of the Contract price.

The Authority reserves the right to reject any or all Bids, to waive informalities, to advertise for new Bids or proceed to do the work otherwise, as may be deemed to be in the best interests of the Authority.
This information may be viewed at the MBTA website:

http://www.mbta.com/business_t/bidding.asp/

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Date: **September 30, 2004**

By: Daniel A. Grabauskas
Secretary and MBTA Chairman

Michael H. Mulhern
General Manager

SECTION 00100

INSTRUCTIONS TO BIDDERS

This Section specifies Instructions to Bidders in accordance with Standard Specifications Section 00100 except as modified herein.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF WORK

C. Complete information and authorization for the Bidders to view the site of the work on Massachusetts Bay Transportation Authority's property shall be obtained from the office of Mr. George Doherty, MBTA Design and Construction, 500 Arborway, Jamaica Plain, MA 02130, telephone (617) 222-3081.

D. The Authority will conduct an inspection tour of the site on **October 27, 2004**. Bidders are requested to be present at Maverick Square, in front of the Headhouse, East Boston, Massachusetts, at **10:00 a.m.** to participate in the tour. Bidders are advised that they should have representation at this tour as no extra visits are planned.

E. In addition to visiting the site for the purposes as specified above the Bidders shall visit the site to ascertain pertinent local conditions readily determined by inspection and inquiry, such as the location, accessibility, traffic conditions and general character of the site, labor conditions, the character and extent of existing work within or adjacent thereto, and any other work being performed.

F. The Authority does not guarantee or represent that existing construction or conditions conform to the Drawings. The Bidder shall visit the site and satisfy himself as to existing conditions. All necessary information shall be verified in the field before fabrication of new material. No claim for extra cost will be allowed by the Authority because of the Contractor's unfamiliarity with site conditions.

1.04 SUBSURFACE CONDITIONS DATA

F. Test boring logs for test borings indicated and identified on the Contract Drawings are included in the Geotechnical Data Report.

1. The Geotechnical Data Report for the MBTA Maverick Square Station Project, dated August, 2003, is issued and attached to Section 02000, GEOTECHNICAL DATA of the Construction Specifications.

G. In addition to any geotechnical information presented in the sources and classifications listed above, the results of environmental testing performed during the subsurface investigation program is available upon request.

1.05 PREPARATION OF BIDS

A. Bid Prices

4. The Schedule of Bid Prices included in the following Form For Bid of this Bid Form will be used for the indicating of the Bid price information specified above.

5. In the event that there is an error in the computed totals based upon the unit prices and estimated quantities, the unit prices shall govern.

B. Addenda

2. The Bidder is required to acknowledge receipt of any addendum (a) issued to this contract by inserting the addendum (a) number in the space provided on **Page 15B** of this Bid Form.

D. Affidavits

3. Bids must contain the properly completed affidavit of non-collusion on **Page 22B** of this Bid Form.

1.06 DELIVERY OF BIDS

A. Bidders are advised that the Bid Form must include a Bid price for each of the items listed on the Contract Schedule of Bid Prices (pages **17B(a)** through **17B(uu)**, as well as Alternate No. 1 (page **17B(ss)**, Alternate No. 2 (page **17B(tt)**), and Alternate No. 3 (page **17B(uu)**). The omission of a Bid price for any of the items or alternates is cause for rejection of all Bid prices of the Bid.

1.07 BID GUARANTY REQUIRED

A. In order to insure the faithful fulfillment of its term, each Bid shall be accompanied by a Bid Guaranty. Bid Guaranty shall be in the amount as specified in the "Notice to Bidders" in the form of an acceptable bid bond, cash, certified check, treasurer's or cashier's check issued to the MBTA by a responsible bank or trust company or by a surety or insurance company licensed or authorized by the Massachusetts Division of Insurance to engage in the business of surety in the Commonwealth and satisfactory to the Authority. Bid Guaranty shall be enclosed in a sealed envelope and be submitted with the Bid Form.

1.08 WITHDRAWAL OF BIDS

A. 1. If not earlier returned, when any such Bid is reached during the opening of the Bids, it will be returned to the Bidder unread.

1.10 REJECTION OF BIDS

B. 2. Bidders are advised that the certificate pertaining to ineligible Contractors on **Page 18B** of the Bid Form must be completed in its entirety. Failure to fully complete and submit the required certification will be considered an informality and may render the Bid non-responsive.

1.15 AWARD OF CONTRACT

B. Basis of Award. The Contract will be awarded by the Authority subject to the reservations of Section 00100 Article 1.14 as specified above, within 60 calendar days after opening of Bids to the lowest responsible and eligible Bidder whose Total Estimated Contract Bid Price, based upon the proposed schedule of unit, lump sum, and allowance Bid Prices, is the lowest Bid received, excluding Alternates No. 1, No. 2 and No. 3. The Authority reserves the right to select and to proceed with or without the Alternates.

1.17 RETURN OF BID GUARANTY

B. Bid Guarantees of lowest bidder and second lowest bidder will be retained until execution of the contract, previous to which, however, either Bidder who submitted cash, certified check, treasurer's or cashier's check as Bid Guaranty, may substitute a bid bond in an acceptable form furnished by a surety

or insurance company licensed or authorized by the Massachusetts Division of Insurance to engage to the business of surety in the Commonwealth and satisfactory to the Authority.

1.18 CONTRACT BONDS REQUIRED

C. 1. Surety may be a bond in an acceptable form furnished by a surety or insurance company licensed or authorized by the Massachusetts Division of Insurance to engage in the business of surety in the Commonwealth and satisfactory to the Authority.

1.21 INTERPRETATION OF BID DOCUMENTS

A. All questions about the meaning and intent of Bid Documents shall be submitted in writing, to the Chief of Design and Construction of the Massachusetts Bay Transportation Authority, at the address specified in the Notice to Bidders. To be given consideration, all questions must be received at least 10 days prior to the date fixed for the opening of Bids. An interpretation of all questions which Authority elects to give will be issued by written Addenda. Only questions answered by formal written Addenda will be binding. Oral communications or interpretations will be without binding legal effect. Addenda will be mailed, by certified mail with return receipt requested, to all who obtained Bid Documents. All Addenda so issued shall become part of the Bid Documents. Obvious discrepancies in Bid Documents which are not addressed by a Bidder in accordance with the above procedure will be construed against the successful Bidder should a dispute arise.

B. A separate copy of the questions referring to meaning and intent of the Bid Documents shall be mailed to the Project Manager, at the address specified in the Notice to Bidders, and to be given consideration must be received at least 10 days prior to the date fixed for the openings of Bids. All interpretations the Authority elects to give will be made in the form of written Addenda to the Contract Documents, which Addenda shall become a part of the Bid Documents. The Addenda will be mailed to all persons who obtained Bid Documents in the manner described in the Notice to Bidders.

1.23 STANDARD SPECIFICATIONS, CONSTRUCTION

A. 1. Standard Specifications, Construction is available at a charge of $15.00 each, which is not refundable, and is to be considered part of the Contract Documents.

1.24 DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION PROVISION

A. Attention of all Bidders is directed to the assurance to be submitted with their Bids that they will make sufficient reasonable efforts to meet the stated DBE goal for this Contract. This assurance is provided on **Page 19B** of the Bid Form.

B. In addition, the attention of Bidders is directed to the requirements of the Disadvantaged Business Enterprise Participation Provision included as Appendix 3 of the Supplementary conditions. Forms included on **Pages 34B** through **37B** of this Bid Form may be reproduced for additional copies. Failure to comply and submit the required documentation will render the Bid non-responsive.

C. For the purpose of this Contract, Bidders are reminded that the MBTA will only accept DBE's that are certified by the State Office of Minority and Women Business Assistance (SOMWBA) or a certified out-of-state firm certified under Section 8(a) of the Small Business Act. The Bidder must attach the DBE's most recent certification letter or document to the Affidavit on **Page 36B**.

1.25 BUY AMERICA

A. This solicitation and the resulting contract are subject to the Buy America requirements of 49 U.S.C. §5323(j) and the Federal Transit Administration's implementing regulations found at 49 CFR Part 661. These regulations require, as a matter of responsiveness, that the bidder or offeror submit with its offer a completed certification in accordance with § 661.6 or § 661.12, as appropriate.

B. A Buy America Certificate, as per attached format on **Page 23B,** must be completed and submitted with the bid. A bid which does not include the certificate will be considered non-responsive.

C. A waiver from the Buy America Provision may be sought by the Authority if grounds for the waiver exists.

D. Section 165a of the Surface Transportation Assistance Act of 1982, as amended, permits FTA participation on this contract only if steel and manufactured products used in the contract are produced in the United States.

1.27 PREBID CONFERENCE

A. A prebid conference will be held on **October 27, 2004** at **2:00 p.m.** at MBTA Design and Construction, 500 Arborway, Jamaica Plain, in the Conference Room No. 1. It is imperative that prospective Bidders have a representative attend this meeting. Any request for interpretation of drawings and specifications should be submitted in writing at the same time.

1.28 BIDDING AND CONTRACT REQUIREMENTS, DIVISION 1-GENERAL REQUIREMENTS

A. Copies of the Authority's BIDDING AND CONTRACT REQUIREMENTS AND DIVISION 1 - GENERAL REQUIREMENTS, as amended, will be applicable to this Contract, is incorporated by reference, and may be purchased from the Contract Administration Office, Massachusetts Bay Transportation Authority, Transportation Building, 10 Park Plaza, Boston, Massachusetts 02116-3975, at a non-refundable charge of $5.00 each.

1.29 EQUAL EMPLOYMENT OPPORTUNITY (EEO)

A. Attention of all Bidders is directed to Section 00700, General Conditions, Article 5.26, and Paragraph DD of the Supplementary Conditions. Compliance with these Specifications requires completion in full of the certification contained on **Page 19B** of the Form for Bid. Failure to comply fully and submit the required Certification may render the Bid non-responsive.

1.30 BIDDER STATUS IDENTIFICATION

A. Bidder's attention is directed to the applicable section of **Page 20B** and **21B** regarding status identification. Bidders are advised that the applicable section of the above must be complete in its entirety.

1.31 CERTIFICATION OF DUMPING FACILITIES

A. Bidders are advised that the Certification of Dumping Facilities attached on **Page 25B** must be completed in its entirety.

1.32 RIGHT-TO-KNOW LAW

A. Bidders are advised that the Right-to-Know Law Certification attached on **Page 24B** must be completed in its entirety.

1.33 POST APPEALS

A. Post - Bid appeals shall be made within five (5) working days of the bid opening date and shall be made as follows:

1. The initial protest or appeal shall be made to the Deputy Director of Construction, Contracts who will collect the factual information pertaining to the appeal.

2. Upon collecting such factual information, the Office of Contract Administration will forward such information to the General Counsel for a recommendation as to the merits of the appeal.

3. After discussion with the Office of Contract Administration, the General Counsel, in conjunction with the Office of Contract Administration, will forward a recommendation to the Assistant General Manager of Design and Construction.

4. If the Assistant General Manager of Design and Construction does not concur with the recommendations, the Deputy will obtain any other additional information required so that a determination can be made, at which time the interested party will be notified in writing of the Authority's determination.

5. If the interested party does not agree with the determination, he/she may appeal directly to the Authority's General Counsel in writing.

6. The General Counsel will review all facts of the appeal and will make a final determination and will advise both the interested party and the Assistant General Manager of Design and Construction.

7. The Authority reserves the right to extend the post-bid appeal period beyond the five- (5) day limitation when deemed necessary by the Authority.

8. "Interested Party" means an actual or prospective bidder or offeror whose direct economic interest would be affected by the award of a contract or by the failure to award a contract.

9. ONCE THE GENERAL COUNSEL'S DETERMINATION HAS BEEN MADE, THE AUTHORITY'S DECISION IS FINAL AND WILL NOT BE RECONSIDERED UNLESS THERE IS ADDITIONAL INFORMATION WHICH WAS NOT AVAILABLE TO THE APPEALING PARTY AT THE TIME THE APPEAL WAS MADE.

10. Judicial or administrative authorities which may have jurisdictions over bid protests are as following:

- $25,000 or more - Superior Court Department of the Trial Court of the Commonwealth of Massachusetts.

- Under $25,000 - District Court for that city, i.e., Boston Municipal Court, Cambridge District Court, etc.

- o Massachusetts Attorney General's Office.

B. In the event that the subject contract procurement is federally funded, all prospective interested parties are notified of the following:

1. Interested parties may elect to issue a protest to the FTA if the interested party reasons that the MBTA failed to have or follow written protest procedures. If an interested party elects to issue a protest to the Federal Transit Administration (FTA), the protest must be filed in accordance with FTA Circular 4220.1B (as periodically updated).

2. FTA may entertain a protest that alleges the MBTA failed to have or follow written protest procedures.

3. If a protest is filed prior to award, all firms sent a copy of the bid documents or firms that have been issued a formal proposal number, will be notified of the pending protests existence.

4. The MBTA may elect to proceed with the procurement which may include the opening of bids and the subsequent award of a contract, regardless of the existence of a protest that is pending, in the event that a determination has been made that:

   a. The supplies or services to be contracted for are urgently required;

   b. Delivery or performance will be unduly delayed by failure to make award promptly;

   c. Failure to make a prompt award will otherwise cause undue harm to the MBTA or the Federal Government.

   If award is made, the procurement file will be documented to explain the basis for the award. Written notice of the decision to proceed with the award will be sent to the protestor and other interested parties.

1.34 Certification regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion

A. The Bidder will meet the requirements of 49 CFR Part 29 related to Debarment, Suspension, Ineligibility and Voluntary Exclusion.

B. In accordance with 49 CFR Part 29 and the "Instructions for Certification", the Bidder will provide either a "Primary Participant" certification **(Page 27B** and **28B)**, if the contract value is $100,000.00 or more, or a "Lower Tier" certification **(Pages 29B** and **30B)**, if the contract value exceeds $25,000.00 and is less than $100,000.00.

C. Additionally, for a contract of $100,000.00 or more, the Bidder will obtain a "Lower Tier certification" **(Pages 29B** and **30B)** from its proposed subcontractors if the subcontracts are expected to exceed $25,000.00. (See Paragraph D).

D. Lower Tier Certification (including DBE Subcontractors) is **not required as part of the bid submittal** but may be submitted as soon as practicable but in all cases prior to subcontractor approval by the Authority in accordance with Article 6.01., Paragraph E of the Authority's Standard Specifications", General Conditions Section 00700.

E. In the event a Bidder cannot provide a certification as set forth above, an explanation will be provided and attached to the certification.

1.35 Lobbying Restrictions

A. Restrictions

1. The Contractor shall timely comply with the requirements of the lobbying restrictions set forth in Section 301 of Public Law 101 - 121, as implemented by the Department of Transportation in 49 C.F.R. Part 20, and as those authorities may be hereafter amended.

2. If a Standard Form - LLL, "Disclosure Form to Report Lobbying", is required to be completed by the Contractor or subcontractor at any tier, such disclosure shall be furnished to the Deputy Director of Construction - Contracts.

B. Certification of Restrictions on Lobbying

1. The Bidder certifies on **Page 31B** of the Form for Bid, to the best of his or her knowledge or belief that it and it's Principals:

   (a) No Federal appropriated funds have been paid, or will be paid, by or on behalf of the undersigned, to any person for the influencing or the attempting to influence an officer or employee of any agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering of any cooperative agreement and the extension, continuation, renewal, Amendment, or modification of any cooperative of any Federal contract, grant, loan or agreement.

   (b) If any funds other than Federal appropriate funds have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions.

   (c) The undersigned shall require that the language of this certification be included in the award Documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made and entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 or not more than $100,000 for each failure.

1.36 MBTA Y2K2000 Compliance Contract Clause

A. The contractor represents and warrants that the product(s) and/or services(s) for this contract are Year 2000 compliant. Year 2000 compliant means information technology that accurately processes date/time data (including, but not limited to, calculation, comparing, and sequencing) from, into and

between the twentieth and twenty-first centuries and the years 1999 and 2000 and leap year calculation. Furthermore, Year 2000 compliant information technology, when used in combination with other information technology properly exchanges date/time date with it. This warranty shall survive the expiration or termination of this contract.

B. Bidders are advised that the MBTA Y2K2000 Compliance Certification attached on page **32B** must be completed in its entirety.

1.37 CERTIFICATION OF CONSTRUCTION EQUIPMENT STANDARD COMPLIANCE

A. The contractor certifies that all diesel construction equipment used in this contract shall have emission control devices installed, such as oxidation catalysts or particulate filters on the exhaust system side of the diesel combustion engine equipment.

B. Bidders are advised that the MBTA Construction Equipment Standard Compliance attached on page **33B** must be completed in its entirety

END OF SECTION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
TRANSPORTATION BUILDING
10 PARK PLAZA
BOSTON, MASSACHUSETTS 02116-3975

FORM FOR BID

TO THE MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

The undersigned hereby declares to have carefully examined the annexed form of Contract, Specifications and Plans therein referred to and also the sites upon which the Project Work is to be performed.

The undersigned proposes to furnish all labor, materials, and equipment required for Massachusetts Bay Transportation Authority Contract No. **S10CN04, Blue Line Modernization Project, Maverick Square Station and Blue Line Vents, East Boston, Massachusetts**, for the Massachusetts Bay Transportation Authority in accordance with the Plans and Specifications prepared by **DMJM+HARRIS, Inc., 66 Long Wharf, Boston, Massachusetts (for the Maverick Square Station portion) and Parsons Brinkerhoff Quade & Douglas, Inc., 75 Arlington Street, Boston, Massachusetts (for the Blue Line Vents portion)** for the unit price, lump sum and allowance prices specified in the Schedule of Bid Prices, subject to additions and deductions according to the terms of the Specifications.

Accompanying this Bid Form is a bid deposit in the amount of five (5) percent of the value of the bid which shall become the property of the Massachusetts Bay Transportation Authority if, in case this Bid shall be accepted by said Authority, the undersigned shall fail to comply with the applicable statutes or fail as required hereby to execute the Contract with, and furnish bonds and certificates to, said Authority, within the time provided.

The undersigned also hereby declares that he is the only person interested in this Bid; that it is made without any connection with any other persons making any Bid for the same Work; that no person acting for, or employed by, the Massachusetts Bay Transportation Authority is directly or indirectly interested in this Bid, or in any contract which may be made under it, or in expected profits to arise therefrom; and it is made without directly or indirectly influencing or attempting to influence any other person or corporation to bid or to refrain from bidding or to influence the bid of any other person or corporation and that this Bid is made in good faith, without collusion or connection with any person bidding for the same work; and that this Bid is made with distinct reference and relation to the Plans and Specifications prepared for this case and herein mentioned. The undersigned declares that in regard to the conditions affecting the work to be done and the labor and materials needed, this Bid is based solely on his own investigation and research and not in reliance upon any plans, surveys, measurements, dimensions, calculations, estimates or representations of any employee, officer, or agent of the Authority.

If the Bidder is a foreign corporation it agrees, in case this Bid is accepted, to comply with the applicable provisions of Massachusetts General Laws, Chapter 181, before the time for execution of the Contract, as hereinafter provided, occurs.

The undersigned proposes and agrees that, if within sixty (60) calendar days after the opening of bids, notice that the Bid has been accepted by the Authority shall be mailed to him at the business address given below, he shall execute the Contract and furnish a Performance Bond and also a Labor and Materials Payment Bond for the full amount of the Contract price, within ten (10) calendar days after the date of the Notice of Award.

The undersigned agrees to commence work within fifteen (15) calendar days from the date of the mailing of the executed Contract to the Contractor (Section 00700 of these Specifications) unless otherwise ordered in writing by the Engineer; and he shall complete the entire Work, fully and acceptably, within 972 calendar days after the date for mailing of the executed Contract.

The undersigned covenants that he has not employed or retained any company or person (other than a full time bona fide employee working for the Contractor) to solicit or secure this Contract, and that he has not paid or agreed to pay any company or person (other than such an employee) any gift, fee, contribution, percentage, or brokerage fee contingent upon or resulting from the award of this Contract.

The Contractor warrants, represents and agrees that during the time this Contract is in effect, neither it nor any affiliated company, as hereinafter defined, participates in or cooperates with an international boycott, as defined in Section 999 (b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engages in conduct declared to be unlawful by Section 2 of Chapter 151E, Massachusetts General Laws. If there shall be a breach in the warranty representation and agreement contained in this paragraph, then without limiting such other rights as it may have, the MBTA shall be entitle to rescind this Contract. As used herein, an affiliated company shall be any business entity of which at least 51 percent of the ownership interests are directly or indirectly owned by the Contractor or by a person or persons or business entity or entities directly or indirectly owning at least 51 percent of the ownership interests of the Contractor, or which directly or indirectly owns at least 51 percent of the ownership interest of the Contractor.

SCHEDULE OF BID PRICES

THE SUBDIVISION OF THE TOTAL ESTIMATED CONTRACT BID PRICES IS AS FOLLOWS:

This bid includes **Addendum (s)** numbered

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

CONTRACT BASE BID PRICE

The **Total Estimated Contract Base Bid Price** based upon the schedule of proposed Unit, Lump Sum and Allowance Bid Prices (Excluding Alternates 1 through 3) is:

Thirty million four hundred twenty thousand Dollars

Amount in Words eight hundred eighty five dollars & ninety cents

$ 30,420,885.90

Amount in Figures

USE BLACK INK OR TYPEWRITER IN COMPLETION OF FORM FOR BID AND THE SCHEDULE OF BID PRICES

ENTER TOTAL FROM PAGE NO. 17B(rr) EXCLUDING THE PRICES FOR ALTERNATE No. 1 FROM PAGE No. 17B(ss), ALTERNATE No. 2 FROM PAGE No. 17B(tt), AND ALTERNATE No. 3 FROM PAGE No. 17B(uu).

Alternate No. 1: Escalator at South Head House

If Alternate No. 1 is selected by the Authority, add the following to the Total Estimated Contract Bid Price:

One Million, Eight Hundred Twenty Thousand Dollars + no cents

Amount in Words

$ 1,820,000.00

Amount in Figures

ENTER AMOUNT FROM PAGE No. 17B(ss)

Alternate No. 2: South Elevator and Fare array at South Headhouse

If Alternate No. 2 is selected by the Authority, add the following to the Total Estimated Contract Bid Price:

Three Hundred Eighty Thousand ~~~~ Dollars + no cents
Amount in Words

$ 380,000.00
Amount in Figures

ENTER AMOUNT FROM PAGE No. 17B(tt)

Alternate No. 3: Platform Tile Paving

If Alternate No. 3 is selected by the Authority, add the following to the Total Estimated Contract Bid Price:

Two Hundred Twenty Five Thousand ~~ Dollars + no cents
Amount in Words

$ 225,000.00
Amount in Figures

ENTER AMOUNT FROM PAGE No. 17B(uu)

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
0110.002	CPM SCHEDULING	1.00	AT Four Hundred Thousand Dollars and Zero Cents	FP Fixed Price $400,000.00	$400,000.00
0120.169	TILT PLATES	2.00	AT Ten Thousand Dollars and Zero Cents	EA Each $10,000.00	$20,000.00
0120.178	VERTICAL MONITORING POINT	28.00	AT Forty-two Dollars and Zero Cents	EA Each $42.00	$1,176.00
0120.185	HORIZONTAL TAPE EXTENSOMETER ANCHORS	6.00	AT One Hundred Twenty-five Dollars and Zero Cents	PR Pair $125.00	$750.00
0120.192	INCLINOMETER	160.00	AT Sixty-five Dollars and Zero Cents	LF Linear Foot $65.00	$10,400.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0120.233	GEOTECH. MONITORING PROGRAM	1.00	AT Twelve Thousand Dollars and Zero Cents	LS Lump Sum $12,000.00	$12,000.00
0120.305	SURFACE SETTLEMENT POINT	25.00	AT Twenty-six Dollars and Zero Cents	EA Each $26.00	$650.00
0120.351	SEISMOGRAPH EQUIPMENT	2.00	AT Eight Thousand Dollars and Zero Cents	EA Each $8,000.00	$16,000.00
0120.410	SURFACE TARGETS	50.00	AT Forty-two Dollars and Zero Cents	EA Each $42.00	$2,100.00
0120.490	OBSERVATION WELL	80.00	AT Sixty-six Dollars and Zero Cents	LF Linear Foot $66.00	$5,280.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0130.110	FIELD OFFICE	1.00	AT Three Hundred Thousand Dollars and Zero Cents	LS Lump Sum $300,000.00	$300,000.00
0130.200	VEHICULAR AND PEDESTRIAN TRAFFIC MAINT. AND CONTROL	1.00	AT One Hundred Twenty Thousand Dollars and Zero Cents	LS Lump Sum $120,000.00	$120,000.00
0130.430	TRAFFIC OFFICERS SERVICES	1.00	AT Six Hundred Fifty-four Thousand Dollars and Zero Cents	AL Allowance $654,000.00	$654,000.00
0160.091	LICENSED SITE PROFESSIONAL SERVICES	1.00	AT One Hundred Fifty Thousand Dollars and Zero Cents	AL Allowance $150,000.00	$150,000.00
0170.505	MOBILIZE AND DEMOBILIZE	1.00	AT Nine Hundred Thousand Dollars and Zero Cents	LS Lump Sum $900,000.00	$900,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0211.000	DEMOLITION	1.00	AT Two million five dollar hundred thousand & zero cents	LS Lump Sum 2,520,000.00	2,520,000.00
0211.463	BOSTON WATER AND SEWER COMMISSION UTILITIES	1.00	AT Twenty-five Thousand Dollars and Zero Cents	AL Allowance $25,000.00	$25,000.00
0211.482	ELECTRIC SERVICE RELOCATION	1.00	AT One Hundred Twenty-eight Thousand Dollars and Zero Cents	AL Allowance $128,000.00	$128,000.00
0211.486	GAS UTILITY RELOCATION	1.00	AT Thirty-five Thousand Dollars and Zero Cents	AL Allowance $35,000.00	$35,000.00
0211.488	TELEPHONE RELOCATION	1.00	AT Thirty-five Thousand Dollars and Zero Cents	AL Allowance $35,000.00	$35,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0211.489	CITY OF BOSTON FIRE DEPT. UTILITY RELOCATION	1.00	AT Five Thousand Dollars and Zero Cents	AL Allowance $5,000.00	$5,000.00
0211.610	PEDESTRIAN RAMP	205.00	AT Forty-five Dollars and Zero Cents	SY Square Yard $45.00	$9,225.00
0211.804	REMOVE AND DISPOSE OF ABOVE-GROUND STORAGE TANKS	1.00	AT Nine Thousand Dollars and Zero Cents	LS Lump Sum $9,000.00	$9,000.00
0212.153	REMOVE LEAD PAINT	1.00	AT Fifty Thousand Dollars and Zero Cents	LS Lump Sum $50,000.00	$50,000.00
0212.174	ASBESTOS REMOVAL	1.00	AT One Hundred Seventy-five Thousand Dollars and Zero Cents	AL Allowance $175,000.00	$175,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0212.177	ASBESTOS REMOVAL	1.00	AT Twenty-two Thousand Dollars and Zero Cents	LS Lump Sum $22,000.00	$22,000.00
0212.800	PRECONSTRUCTION SURVEYS	1.00	AT Fifty Thousand Dollars and Zero Cents	LS Lump Sum $50,000.00	$50,000.00
0213.201	RODENT CONTROL	1.00	AT Seventy-five Thousand Dollars and Zero Cents	AL Allowance $75,000.00	$75,000.00
0214.110	TEMPORARY EXCAVATION SUPPORT SYSTEM	1.00	AT One Million Dollars and Zero Cents	LS Lump Sum $1,000,000.00	$1,000,000.00
0220.098	SITE PREPARATION	1.00	AT Eighty Thousand Dollars and Zero Cents	LS Lump Sum $80,000.00	$80,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0221.342	DISPOSE OF FILL	7,085.00	AT Ten Dollars and Zero Cents	TN Ton $10.00	$70,850.00
0221.345	DISPOSE OF CONTAMINATED SOIL AT IN-STATE LINED LANDFILL	308.00	AT Forty Dollars and Zero Cents	TN Ton $40.00	$12,320.00
0221.346	DISPOSE OF HAZARDOUS SOIL OUT-OF-STATE LINED LANDFILL	308.00	AT Seventy Dollars and Zero Cents	TN Ton $70.00	$21,560.00
0221.347	DISPOSE OF CONTAMINATED SOIL IN-STATE RECYCLING FACILITY	1,851.00	AT Forty Dollars and Zero Cents	TN Ton $40.00	$74,040.00
0221.349	CONTAMINATED SOIL DISPOSAL AT NON-RCRA OUT-OF-STATE LANDFILL	308.00	AT Sixty Dollars and Zero Cents	TN Ton $60.00	$18,480.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0222.003	UNCLASSIFIED EXCAVATION	6,059.00	AT One Hundred Twenty-five Dollars and Zero Cents	CY Cubic Yard $125.00	$757,375.00
0222.005	TRENCH EXCAVATION AND BACKFILL	74.00	AT Two Hundred Twenty-five Dollars and Zero Cents	CY Cubic Yard $225.00	$16,650.00
0222.018	SCREEN AND STOCKPILE MATERIAL	12,337.00	AT One Dollar and Zero Cents	CY Cubic Yard $1.00	$12,337.00
0222.024	NON-RECLAIMABLE PETROLEUM PRODUCT / GROUNDWATER	7,000.00	AT One Dollar and Zero Cents	GL Gallon $1.00	$7,000.00
0222.108	ROCK EXCAVATION	129.00	AT One Hundred Dollars and Zero Cents	CY Cubic Yard $100.00	$12,900.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0222.150	TRENCH EXCAVATION - CLASS A	150.00	AT One Hundred Twenty Dollars and Zero Cents	CY Cubic Yard $120.00	$18,000.00
0222.363	HAZARDOUS MATERIALS HEALTH AND SAFETY PLAN	1.00	AT Five Thousand Five Hundred Dollars and Zero Cents	LS Lump Sum $5,500.00	$5,500.00
0222.364	HAZARDOUS MATERIALS ABATEMENT WORK PLAN	1.00	AT Sixteen Hundred Dollars and Zero Cents	LS Lump Sum $1,600.00	$1,600.00
0222.365	DISPOSE OF RCRA HAZARDOUS WASTE	308.00	AT One Hundred Dollars and Zero Cents	TN Ton $100.00	$30,800.00
0222.369	REMOVE AND DISPOSE OF DECONTAMINATION WATER	1,000.00	AT One Dollar and Zero Cents	GL Gallon $1.00	$1,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0222.409	REMOVE AND DISPOSE OF HAZARDOUS WASTE	1.00	AT Two Thousand Dollars and Zero Cents	TN Ton $2,000.00	$2,000.00
0222.411	REMOVE AND DISPOSE OF SPECIAL WASTE	1.00	AT Five Hundred Dollars and Zero Cents	TN Ton $500.00	$500.00
0222.414	DISPOSE OF HAZARDOUS WASTE	1.00	AT Two Thousand Dollars and Zero Cents	TN Ton $2,000.00	$2,000.00
0222.456	DECONTAMINATION	1.00	AT Fifteen Thousand Dollars and Zero Cents	LS Lump Sum $15,000.00	$15,000.00
0222.458	DISPOSE OF CONTAMINATED SOIL	9,253.00	AT Twenty-six Dollars and Zero Cents	TN Ton $26.00	$240,578.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0222.460	DISPOSE OF CONTAMINATED GROUNDWATER	100,000.00	AT Zero Dollars and Fifty Cents	GL Gallon $0.50	$50,000.00
0222.498	SAND BORROW	1.00	AT Thirty-eight Dollars and Zero Cents	CY Cubic Yard $38.00	$38.00
0222.504	GRAVEL BORROW	11,968.00	AT Fifteen Dollars and Zero Cents	CY Cubic Yard $15.00	$179,520.00
0222.520	CATCH BASIN OR MANHOLE ABANDONED	10.00	AT Eight Hundred Dollars and Zero Cents	EA Each $800.00	$8,000.00
0222.599	3/4" WASHED CRUSHED STONE	273.00	AT Forty-six Dollars and Zero Cents	CY Cubic Yard $46.00	$12,558.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0225.150	DISPOSE OF NONRECYCLABLE OIL	500.00	AT Two Dollars and Zero Cents	GL Gallon $2.00	$1,000.00
0225.151	REMOVE AND DISPOSE OF OIL, HAZARDOUS CHEMICALS AND MATERIALS	1,000.00	AT One Dollar and Twenty-five Cents	LB Pound $1.25	$1,250.00
0234.195	BOLLARDS	63.00	AT Fourteen Hundred Dollars and Zero Cents	EA Each $1,400.00	$88,200.00
0234.196	LIGHTED BOLLARD	8.00	AT Four Thousand Dollars and Zero Cents	EA Each $4,000.00	$32,000.00
0250.006	OBSTRUCTION REMOVAL	160.00	AT Two Hundred Dollars and Zero Cents	HR Hour $200.00	$32,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0250.010	CLEANING PIPE	20.00	AT Twenty-seven Dollars and Zero Cents	LF Linear Foot $27.00	$540.00
0250.015	CLEAN CATCH BASINS AND MANHOLES	4.00	AT Four Hundred Dollars and Zero Cents	EA Each $400.00	$1,600.00
0250.102	CATCH BASINS ECC MUNICIPAL STANDARD	16.00	AT Two Thousand One Hundred Dollars and Zero Cents	EA Each $2,100.00	$33,600.00
0250.111	SPECIAL CATCH BASIN	1.00	AT Eighteen Hundred Dollars and Zero Cents	EA Each $1,800.00	$1,800.00
0250.118	CATCH BASIN OR MANHOLE ADJUSTED	10.00	AT Three Hundred Twenty-five Dollars and Zero Cents	EA Each $325.00	$3,250.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0251.588	10" PVC PIPE	193.00	AT Ninety Dollars and Zero Cents	LF Linear Foot $90.00	$17,370.00
0251.768	6" DUCTILE IRON PIPE	290.00	AT Ninety Dollars and Zero Cents	LF Linear Foot $90.00	$26,100.00
0251.770	8" DUCTILE IRON PIPE	30.00	AT Ninety Dollars and Zero Cents	LF Linear Foot $90.00	$2,700.00
0251.776	16" DUCTILE IRON PIPE	148.00	AT One Hundred Thirty-five Dollars and Zero Cents	LF Linear Foot $135.00	$19,980.00
0251.818	12" DUCTILE IRON PIPE	25.00	AT One Hundred Dollars and Zero Cents	LF Linear Foot $100.00	$2,500.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0255.005	TEMPORARY WATER SERVICE	1.00	AT Thirty Thousand Dollars and Zero Cents	LS Lump Sum $30,000.00	$30,000.00
0255.077	FRAME AND GRATE OR COVER - MUNICIPAL STANDARD	26.00	AT Seven Hundred Dollars and Zero Cents	EA Each $700.00	$18,200.00
0255.089	DROP INLET-ECC	3.00	AT Seventeen Hundred Dollars and Zero Cents	EA Each $1,700.00	$5,100.00
0255.096	DRAIN MANHOLE ECC MUNICIPAL STANDARD	13.00	AT Two Thousand Three Hundred Dollars and Zero Cents	EA Each $2,300.00	$29,900.00
0255.097	DRAIN MANHOLE ECC (9' TO 14' DEPTH)	1.00	AT Seven Thousand Three Hundred Dollars and Zero Cents	EA Each $7,300.00	$7,300.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0255.196	SANITARY SEWER MANHOLE ECC MUNICIPAL STANDARD	1.00	AT Five Thousand Dollars and Zero Cents	EA Each $5,000.00	$5,000.00
0261.115	SAW CUTTING BITUMINOUS CONCRETE	10,411.00	AT Four Dollars and Zero Cents	LF Linear Foot $4.00	$41,644.00
0261.126	BITUMINOUS CONCRETE EXCAVATION BY COLD PLANE	6,760.00	AT Three Dollars and Zero Cents	SY Square Yard $3.00	$20,280.00
0261.144	BITUMINOUS CONCRETE PATCH	2,512.00	AT Twenty-five Dollars and Zero Cents	SY Square Yard $25.00	$62,800.00
0261.200	CLASS I, BITUMINOUS CONCRETE PAVEMENT TYPE I-1, TOP COURSE	945.00	AT Seventy Dollars and Zero Cents	TN Ton $70.00	$66,150.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0261.201	CLASS I BITUMINOUS CONCRETE PAVEMENT TYPE I-1 BASE COURSE	2,890.00	AT Sixty Dollars and Zero Cents	TN Ton $60.00	$173,400.00
0262.214	GRANITE CURB TYPE VA4 STRAIGHT	2,116.00	AT Forty Dollars and Zero Cents	LF Linear Foot $40.00	$84,640.00
0262.215	GRANITE CURB TYPE VA4 CURVED	742.00	AT Fifty Dollars and Zero Cents	LF Linear Foot $50.00	$37,100.00
0262.227	GRANITE CURB INLETS, TYPE VA4 STRAIGHT	3.00	AT Four Hundred Dollars and Zero Cents	EA Each $400.00	$1,200.00
0262.249	STRAIGHT GRANITE TRANSITION CURB FOR PEDESTRIAN RAMPS	192.00	AT Thirty-five Dollars and Zero Cents	LF Linear Foot $35.00	$6,720.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0262.250	CURVED GRANITE TRANSITION CURB FOR PEDESTRIAN RAMPS	62.00	AT Thirty-five Dollars and Zero Cents	LF Linear Foot $35.00	$2,170.00
0262.701	CURBING - REMOVE AND RESET	65.00	AT Fifteen Dollars and Zero Cents	LF Linear Foot $15.00	$975.00
0263.116	TACTILE WARNING STRIP	196.00	AT Twenty-two Dollars and Zero Cents	SF Square Foot $22.00	$4,312.00
0263.150	CONCRETE SIDEWALKS	2,645.00	AT Forty Dollars and Zero Cents	SY Square Yard $40.00	$105,800.00
0263.151	CONCRETE DRIVEWAY	34.00	AT Forty-five Dollars and Zero Cents	SY Square Yard $45.00	$1,530.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0282.300	LAWN SOD	15,648.00	AT One Dollar and Zero Cents	SY Square Yard $1.00	$15,648.00
0284.120	TREE GRATES	23.00	AT Two Thousand Dollars and Zero Cents	EA Each $2,000.00	$46,000.00
0284.145	PLANTING	1.00	AT Thirty-five Thousand Dollars and Zero Cents	LS Lump Sum $35,000.00	$35,000.00
0321.100	REINFORCING STEEL	1,010,278.00	AT Zero Dollars and Eighty Cents	LB Pound $0.80	$808,222.40
0321.210	DRILL AND GROUT	553.00	AT Fifty-five Dollars and Zero Cents	LF Linear Foot $55.00	$30,415.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0321.305	WIRE MESH REINFORCEMENT	100.00	AT Four Dollars and Zero Cents	SY Square Yard $4.00	$400.00
0330.073	4000 PSI 3/4" AGGREGATE CONCRETE	3,770.00	AT Six Hundred Fifty Dollars and Zero Cents	CY Cubic Yard $650.00	$2.450,500.00
0335.000	SPECIALLY FINISHED CONCRETE	1.00	AT Five Hundred Thousand Dollars and Zero Cents	LS Lump Sum $500,000.00	$500,000.00
0340.141	TEMPORARY PRECAST CONCRETE BARRIER FOR TRAFFIC CONTROL	638.00	AT Twenty-three Dollars and Zero Cents	LF Linear Foot $23.00	$14,674.00
0340.142	TEMPORARY PRECAST CONCRETE BARRIER FOR TRAFFIC CONTROL - REMOVE AND RESET	1,083.00	AT Eight Dollars and Zero Cents	LF Linear Foot $8.00	$8,664.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0348.412	12" REINFORCED CONCRETE PIPE CLASS IV	637.00	AT Ninety-five Dollars and Zero Cents	LF Linear Foot $95.00	$60,515.00
0348.415	15" REINFORCED CONCRETE PIPE CLASS IV	159.00	AT One Hundred Dollars and Zero Cents	LF Linear Foot $100.00	$15,900.00
0348.418	18" REINFORCED CONCRETE PIPE CLASS IV	153.00	AT One Hundred Ten Dollars and Zero Cents	LF Linear Foot $110.00	$16,830.00
0348.424	24" REINFORCED CONCRETE PIPE CLASS IV	383.00	AT One Hundred Eighteen Dollars and Zero Cents	LF Linear Foot $118.00	$45,194.00
0354.001	STRUCTURAL CRACK REPAIR BY EPOXY INJECTION	600.00	AT Sixty Dollars and Zero Cents	LF Linear Foot $60.00	$36,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0354.004	GROUTING	3,000.00	AT One Dollar and Zero Cents	LF Linear Foot $1.00	$3,000.00
0400.100	SCULPTURE ALLOWANCE	1.00	AT One Hundred Forty-two Thousand Dollars and Zero Cents	AL Allowance $142,000.00	$142,000.00
0420.100	MASONRY	1.00	AT Nine Hundred Thousand Dollars and Zero Cents	LS Lump Sum $900,000.00	$900,000.00
0426.100	PAVERS	2,050.00	AT Twenty Dollars and Zero Cents	SF Square Foot $20.00	$41,000.00
0426.154	BRICK PAVING	3,350.00	AT Twenty Dollars and Zero Cents	SF Square Foot $20.00	$67,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0426.158	INTERLOCKING PRECAST PAVERS	79.00	AT One Hundred Twenty Dollars and Zero Cents	SY Square Yard $120.00	$9,480.00
0440.000	STONE	1.00	AT Six Hundred Thousand Dollars and Zero Cents	LS Lump Sum $600,000.00	$600,000.00
0450.118	GRANITE FEATURE STRIPS	750.00	AT Fifty-five Dollars and Zero Cents	SF Square Foot $55.00	$41,250.00
0451.020	ASPHALT BLOCK PAVING	8,946.00	AT Seventeen Dollars and Zero Cents	SF Square Foot $17.00	$152,082.00
0510.100	STRUCTURAL METAL	78,705.00	AT Seven Dollars and Zero Cents	LB Pound $7.00	$550,935.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0510.350	STRUCTURAL STEEL	118,134.00	AT Six Dollars and Zero Cents	LB Pound $6.00	$708,804.00
0511.004	HIGH STRENGTH THREADED ANCHORS	720.00	AT Sixteen Dollars and Zero Cents	LB Pound $16.00	$11,520.00
0512.118	REPLACE MISCELLANEOUS RIVETS WITH HIGH STRENGTH BOLTS	1.00	AT One Hundred Ninety Dollars and Zero Cents	EA Each $190.00	$190.00
0525.200	STUD SHEAR CONNECTORS	64.00	AT Six Dollars and Zero Cents	EA Each $6.00	$384.00
0548.401	PASS GATES	8.00	AT Six Hundred Dollars and Zero Cents	EA Each $600.00	$4,800.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0548.404	ROTARY GATES	1.00	AT Twenty-six Thousand Dollars and Zero Cents	LS Lump Sum $26,000.00	$26,000.00
0550.000	MISCELLANEOUS METALS	1.00	AT Seven Hundred Twenty Thousand Dollars and Zero Cents	LS Lump Sum $720,000.00	$720,000.00
0550.305	HATCHES	1.00	AT Ten Thousand Dollars and Zero Cents	LS Lump Sum $10,000.00	$10,000.00
0550.978	STAINLESS STEEL WALL PANELS	1.00	AT Fifty Thousand Dollars and Zero Cents	LS Lump Sum $50,000.00	$50,000.00
0550.986	STAINLESS STEEL COLUMN COVERS	1.00	AT One Hundred Eighty Thousand Dollars and Zero Cents	LS Lump Sum $180,000.00	$180,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0570.000	ORNAMENTAL METAL	1.00	AT Three Hundred Eighty Thousand Dollars and Zero Cents	LS Lump Sum $380,000.00	$380,000.00
0610.000	ROUGH CARPENTRY	1.00	AT Sixty Thousand Dollars and Zero Cents	LS Lump Sum $60,000.00	$60,000.00
0711.005	SHEET-APPLIED WATERPROOFING MEMBRANE	1.00	AT Eighty-five Thousand Dollars and Zero Cents	LS Lump Sum $85,000.00	$85,000.00
0716.005	WATERPROOF AND DAMPPROOF - SUBSTATION	1.00	AT Fifteen Thousand Dollars and Zero Cents	LS Lump Sum $15,000.00	$15,000.00
0720.000	BUILDING INSULATION	1.00	AT Forty-four Thousand Dollars and Zero Cents	LS Lump Sum $44,000.00	$44,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0720.105	FIREPROOFING	1.00	AT One Hundred Sixty-five Thousand Dollars and Zero Cents	LS Lump Sum $165,000.00	$165,000.00
0750.000	MEMBRANE ROOFING	1.00	AT Thirty-three Thousand Dollars and Zero Cents	LS Lump Sum $33,000.00	$33,000.00
0760.100	SHEET METAL AND FLASHING	1.00	AT Thirty-three Thousand Dollars and Zero Cents	LS Lump Sum $33,000.00	$33,000.00
0761.000	SHEET METAL ROOFING	1.00	AT Thirty-five Thousand Dollars and Zero Cents	LS Lump Sum $35,000.00	$35,000.00
0790.075	EXPANSION JOINT REPAIR - TYPE A	100.00	AT Fifty-five Dollars and Zero Cents	LF Linear Foot $55.00	$5,500.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0810.000	METAL DOORS AND FRAMES	1.00	AT Eighty-five Thousand Dollars and Zero Cents	LS Lump Sum $85,000.00	$85,000.00
0830.550	GLAZED ENCLOSURES AND ENTRANCES	1.00	AT Eight hundred thousand dollars & zero cents	LS Lump Sum 800,000.00	800,000.00
0865.045	HARDWARE	1.00	AT Thirty Thousand Dollars and Zero Cents	LS Lump Sum $30,000.00	$30,000.00
0910.000	LATH AND PLASTER	1.00	AT Sixteen Thousand Dollars and Zero Cents	LS Lump Sum $16,000.00	$16,000.00
0922.000	METAL CEILING	1.00	AT Nine Hundred Ninety Thousand Dollars and Zero Cents	LS Lump Sum $990,000.00	$990,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0926.000	GYPSUM DRYWALL SYSTEMS	1.00	AT Twenty-eight Thousand Dollars and Zero Cents	LS Lump Sum $28,000.00	$28,000.00
0930.000	TILE WORK	1.00	AT Twenty-five Thousand Dollars and Zero Cents	LS Lump Sum $25,000.00	$25,000.00
0932.307	PLATFORM TACTILE EDGE	1.00	AT Twenty Thousand Dollars and Zero Cents	LS Lump Sum $20,000.00	$20,000.00
0950.011	ACOUSTICAL TREATMENT IN STATION	4,600.00	AT Forty Dollars and Zero Cents	SF Square Foot $40.00	$184,000.00
0965.100	RESILIENT FLOORING	1.00	AT Five Thousand Five Hundred Dollars and Zero Cents	LS Lump Sum $5,500.00	$5,500.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
0981.005	TWO-COMPONENT CEMENTITIOUS PROTECTIVE COATING	3,512.00	AT Six Dollars and Zero Cents	SF Square Foot $6.00	$21,072.00
0986.100	ANTI-GRAFFITI COATING	1.00	AT One Hundred Ten Thousand Dollars and Zero Cents	LS Lump Sum $110,000.00	$110,000.00
0990.000	PAINTING	1.00	AT Two Hundred Thousand Dollars and Zero Cents	LS Lump Sum $200,000.00	$200,000.00
0990.450	SHOP PAINTING OF GALVANIZED STEEL	1.00	AT Forty-four Thousand Dollars and Zero Cents	LS Lump Sum $44,000.00	$44,000.00
1001.000	BUILDING SPECIALTIES	1.00	AT Nine Thousand Dollars and Zero Cents	LS Lump Sum $9,000.00	$9,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
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Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1025.010	INTERIOR FIRE PROTECTION	1.00	AT One Hundred Sixty Thousand Dollars and Zero Cents	LS Lump Sum $160,000.00	$160,000.00
1029.103	BIRD CONTROL	1.00	AT Twenty Thousand Dollars and Zero Cents	AL Allowance $20,000.00	$20,000.00
1040.200	PORCELAIN ENAMEL WORK	1.00	AT Two Hundred Twenty Thousand Dollars and Zero Cents	LS Lump Sum $220,000.00	$220,000.00
1040.707	REFLECTORIZED WHITE LINE CROSSWALKS AND STOPS	2,527.00	AT One Dollar and Fifty Cents	SF Square Foot $1.50	$3,790.50
1040.738	4" REFLECTORIZED THERMOPLASTIC WHITE LINE	816.00	AT One Dollar and Zero Cents	LF Linear Foot $1.00	$816.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1040.920	PAVEMENT MARKING REMOVAL	2,980.00	AT One Dollar and Zero Cents	SF Square Foot $1.00	$2,980.00
1041.272	PORTABLE BREAKAWAY BARRICADE - TYPE III	4.00	AT One Hundred Forty-five Dollars and Zero Cents	EA Each $145.00	$580.00
1041.400	SIGN WORK	1.00	AT Twenty-six Thousand Dollars and Zero Cents	LS Lump Sum $26,000.00	$26,000.00
1042.012	SIGNAGE	1.00	AT Twenty-six Thousand Dollars and Zero Cents	LS Lump Sum $26,000.00	$26,000.00
1042.053	TEMPORARY 4" PAVEMENT MARKINGS (PAINTED)	5,592.00	AT Zero Dollars and Fifty Cents	LF Linear Foot $0.50	$2,796.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
Schedule of Bid Prices
Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1042.056	SPECIAL LIGHTING UNIT (FLASHING ARROW)	1,186.00	AT Twenty-two Dollars and Zero Cents	DY Day $22.00	$26.092.00
1042.058	REFLECT. DRUM WITH FLASHER (TYPE A)	19,710.00	AT Zero Dollars and Forty Cents	DD Drum-Day $0.40	$7.884.00
1042.059	REFLECTORIZED DRUM WITH LIGHT - TYPE C	50.00	AT Zero Dollars and Sixty Cents	DD Drum-Day $0.60	$30.00
1042.111	SIGNS REMOVE AND STACK	1.00	AT Twenty-six Thousand Dollars and Zero Cents	LS Lump Sum $26,000.00	$26,000.00
1042.240	SAFETY SIGNAGE FOR CONSTRUCTION OPERATIONS	968.00	AT Twenty Dollars and Zero Cents	SF Square Foot $20.00	$19,360.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1075.997	FARE COLLECTION	1.00	AT One Hundred Fifty Thousand Dollars and Zero Cents	AL Allowance $150,000.00	$150,000.00
1077.075	PREFABRICATED BOOTHS AND ENCLOSURES	1.00	AT Thirty-two Thousand Dollars and Zero Cents	LS Lump Sum $32,000.00	$32,000.00
1080.000	TOILET ACCESSORIES	1.00	AT Thirteen Thousand Dollars and Zero Cents	LS Lump Sum $13,000.00	$13,000.00
1085.002	VENDING MACHINES	6.00	AT Three Thousand Dollars and Zero Cents	EA Each $3,000.00	$18,000.00
1098.020	TRASH RECEPTACLE	19.00	AT Sixteen Hundred Dollars and Zero Cents	EA Each $1,600.00	$30,400.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1112.000	BICYCLE RACK	9.00	AT Two Thousand Eight Hundred Dollars and Zero Cents	EA Each $2,800.00	$25,200.00
1420.000	ELEVATORS	1.00	AT One Hundred Fifty Thousand Dollars and Zero Cents	LS Lump Sum $150,000.00	$150,000.00
1421.000	ESCALATORS	1.00	AT One Million Four Hundred Thousand Dollars and Zero Cents	LS Lump Sum $1,400,000.00	$1,400,000.00
1501.000	PLUMBING	1.00	AT Three Hundred Thousand Dollars and Zero Cents	LS Lump Sum $300,000.00	$300,000.00
1519.320	3/4" CURB STOP, BOX AND COVER	5.00	AT One Thousand Dollars and Zero Cents	EA Each $1,000.00	$5,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1519.325	1" CURB STOP, BOX AND COVER	5.00	AT One Thousand Dollars and Zero Cents	EA Each $1,000.00	$5,000.00
1519.400	WATER SERVICE BOXES ADJUSTED TO LINE AND/OR GRADE	13.00	AT Two Hundred Dollars and Zero Cents	EA Each $200.00	$2,600.00
1519.500	GATE BOXES ADJUSTED TO LINE AND/OR GRADE	5.00	AT Three Hundred Fifty Dollars and Zero Cents	EA Each $350.00	$1,750.00
1519.510	GATE AND GATE BOX, REMOVE AND STACK	3.00	AT Six Hundred Dollars and Zero Cents	EA Each $600.00	$1,800.00
1519.592	1-1/2" CORPORATION COCK, BOX AND COVER	5.00	AT Twelve Hundred Dollars and Zero Cents	EA Each $1,200.00	$6,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
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Contract S10CN04 ADDENDUM : 9

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1519.594	3/4" CORPORATION COCK, BOX AND COVER	5.00	AT Twelve Hundred Dollars and Zero Cents	EA Each $1,200.00	$6,000.00
1519.596	2" CORPORATION COCK, BOX AND COVER	5.00	AT Thirteen Hundred Dollars and Zero Cents	EA Each $1,300.00	$6,500.00
1519.612	1" CORPORATION COCK, BOX AND COVER	5.00	AT Twelve Hundred Dollars and Zero Cents	EA Each $1,200.00	$6,000.00
1520.107	6" GATE AND GATE BOX - REMOVE AND RESET	5.00	AT Two Thousand Dollars and Zero Cents	EA Each $2,000.00	$10,000.00
1520.390	6" X 16" TAPPING SLEEVE VALVE AND BOX	1.00	AT Six Thousand Dollars and Zero Cents	EA Each $6,000.00	$6,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1520.412	12" X 12" TAPPING SLEEVE VALVE AND BOX	3.00	AT Six Thousand Five Hundred Dollars and Zero Cents	EA Each $6,500.00	$19,500.00
1520.454	12" INSERTION VALVE AND BOX	1.00	AT Three Thousand Five Hundred Dollars and Zero Cents	EA Each $3,500.00	$3,500.00
1521.050	6" DUCTILE IRON WATER MAIN CEMENT LINED	73.00	AT One Hundred Dollars and Zero Cents	LF Linear Foot $100.00	$7,300.00
1521.062	12" DUCTILE IRON WATER MAIN CEMENT LINED	1,176.00	AT One Hundred Dollars and Zero Cents	LF Linear Foot $100.00	$117,600.00
1521.098	DUCTILE IRON FITTINGS FOR WATER MAIN	1,155.00	AT Eight Dollars and Zero Cents	LB Pound $8.00	$9,240.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1521.151	4" COATED STEEL GAS PIPE	47.00	AT Six Hundred Dollars and Zero Cents	LF Linear Foot $600.00	$28,200.00
1521.357	ADJUST GAS VALVE BOX	5.00	AT Two Hundred Fifty Dollars and Zero Cents	EA Each $250.00	$1,250.00
1521.605	3/4" TYPE K COPPER WATER LINE	150.00	AT Thirty Dollars and Zero Cents	LF Linear Foot $30.00	$4,500.00
1521.610	1" TYPE K COPPER WATER LINE	100.00	AT Eighty Dollars and Zero Cents	LF Linear Foot $80.00	$8,000.00
1521.614	1-1/2" TYPE K COPPER WATER LINE	143.00	AT Fifty Dollars and Zero Cents	LF Linear Foot $50.00	$7,150.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1521.617	2" TYPE K COPPER WATER LINE	57.00	AT Fifty Dollars and Zero Cents	LF Linear Foot $50.00	$2,850.00
1550.100	HYDRANTS - REMOVE AND RESET	2.00	AT Two Thousand Two Hundred Dollars and Zero Cents	EA Each $2,200.00	$4,400.00
1551.025	RELOCATION OF DRY STANDPIPE	50.00	AT One Hundred Seventy-five Dollars and Zero Cents	LF Linear Foot $175.00	$8,750.00
1559.020	HEATING, VENTILATION AND AIR CONDITIONING SYSTEM	1.00	AT One Hundred Ten Thousand Dollars and Zero Cents	LS Lump Sum $110,000.00	$110,000.00
1580.010	AIR DISTRIBUTION	1.00	AT One Hundred Eighty-five Thousand Dollars and Zero Cents	LS Lump Sum $185,000.00	$185,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1586.040	TUNNEL VENTILATION SYSTEM	1.00	AT One Million Eight Hundred Thousand Dollars and Zero Cents	LS Lump Sum $1.800.000.00	$1.800.000.00
1597.422	ACTIVATED CARBON	2,000.00	AT One Dollar and Zero Cents	LB Pound $1.00	$2,000.00
1597.525	GROUNDWATER TREATMENT SYSTEM OPERATION	90.00	AT One Hundred Fifty Dollars and Zero Cents	DY Day $150.00	$13,500.00
1600.358	OTHER ELECTRICAL WORK	1.00	AT Twenty Thousand Dollars and Zero Cents	AL Allowance $20,000.00	$20,000.00
1610.105	WIRE, CABLE, CONDUIT	1.00	AT Seven hundred thousand dollars & zero cents	LS Lump Sum 700,000.00	700,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1612.316	4 W. PER FOOT PIPE TRACING CABLE	1,000.00	AT Twenty-two Dollars and Zero Cents	LF Linear Foot $22.00	$22,000.00
1615.280	2 - 4" DUCT TELEPHONE CONDUIT CONCRETE ENCASED	105.00	AT One Hundred Dollars and Zero Cents	LF Linear Foot $100.00	$10,500.00
1615.282	4 - 4" DUCT TELEPHONE CONDUIT CONCRETE ENCASED	277.00	AT One Hundred Twenty Dollars and Zero Cents	LF Linear Foot $120.00	$33,240.00
1617.600	6 - 5" PVC CONDUIT CONCRETE ENCASED	291.00	AT One Hundred Fifty Dollars and Zero Cents	LF Linear Foot $150.00	$43,650.00
1619.225	CONCRETE DUCT BANK	10.00	AT Four Hundred Dollars and Zero Cents	LF Linear Foot $400.00	$4,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1620.025	TRANSFORMERS	15.00	AT Two Thousand Two Hundred Dollars and Zero Cents	EA Each $2,200.00	$33,000.00
1621.098	ELECTRIC MANHOLE 5' X 10' X 7'	1.00	AT Ten Thousand Dollars and Zero Cents	EA Each $10,000.00	$10,000.00
1621.114	TELEPHONE MANHOLE ADJUSTED	22.00	AT One Thousand Dollars and Zero Cents	EA Each $1,000.00	$22,000.00
1623.001	ELECTRICAL AC UNIT SUBSTATION	1.00	AT Six Hundred Seventy-five Thousand Dollars and Zero Cents	LS Lump Sum $675,000.00	$675,000.00
1625.000	GROUNDING SYSTEM	1.00	AT Twenty-five Thousand Dollars and Zero Cents	LS Lump Sum $25,000.00	$25,000.00
				Carried Forward:	

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1626.160	AUTOMATIC TRANSFER SWITCH	1.00	AT One Hundred Thousand Dollars and Zero Cents	LS Lump Sum $100,000.00	$100,000.00
1630.021	EMERGENCY GENERATOR SYSTEM	1.00	AT Seventy Thousand Dollars and Zero Cents	LS Lump Sum $70,000.00	$70,000.00
1630.210	DC ELECTRIFICATION	1.00	AT Twenty Thousand Dollars and Zero Cents	LS Lump Sum $20,000.00	$20,000.00
1633.090	DISTRIBUTION AND BRANCH CIRCUIT PANELBOARDS	1.00	AT Eighty Thousand Dollars and Zero Cents	LS Lump Sum $80,000.00	$80,000.00
1640.010	STATION LIGHTING FIXTURES	1.00	AT Seven Hundred Forty Thousand Dollars and Zero Cents	LS Lump Sum $740,000.00	$740,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
Capital Management System
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Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1640.022	STREET LIGHT, 2 LUMINAIRES, WITH BASE	20.00	AT Four Thousand Dollars and Zero Cents	EA Each $4,000.00	$80,000.00
1640.024	RELOCATED SINGLE STREET LIGHT, NEW BASE	8.00	AT Three Thousand Three Hundred Dollars and Zero Cents	EA Each $3,300.00	$26,400.00
1650.003	SIGNAL & COMMUNICATION SYSTEM	1.00	AT One Million One Hundred Seventy Thousand Dollars and Zero Cents	LS Lump Sum $1,170,000.00	$1,170,000.00
1651.056	TELEPHONE MANHOLE 38Y4046-1 TYPE A	2.00	AT Eight Thousand Dollars and Zero Cents	EA Each $8,000.00	$16,000.00
1651.131	TRAFFIC SIGNALS LOCATION #1	1.00	AT Ninety Thousand Dollars and Zero Cents	LS Lump Sum $90,000.00	$90,000.00
				Carried Forward:	

Massachusetts Bay Transportation Authority
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Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
				Brought Forward:	
1651.200	FIRE ALARM SYSTEM	1.00	AT One Hundred Fifty Thousand Dollars and Zero Cents	LS Lump Sum $150,000.00	$150,000.00
1657.000	CLOCK	1.00	AT Ten Thousand Dollars and Zero Cents	LS Lump Sum $10,000.00	$10,000.00
1662.008	CSA KIOSK	1.00	AT Thirty Thousand Dollars and Zero Cents	EA Each $30,000.00	$30,000.00
1681.000	ELECTRICAL HEATING SYSTEM	1.00	AT Twenty Thousand Dollars and Zero Cents	LS Lump Sum $20,000.00	$20,000.00
1696.011	REMOVE, PROTECT, REINSTALL AND TEST, SIGNAL AND TRACTION POWER SYSTEM	1.00	AT One Hundred Fifteen Thousand Dollars and Zero Cents	LS Lump Sum $115,000.00	$115,000.00
	1,489,927. = SUM OF ALL QTYS.			**Total Estimated Contract Bid Price:**	30,420,885,90

Massachusetts Ba[illegible]nsportation Authority
Capital Ma[illegible]gement System
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Alternate No. A01 Line Items

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
0001.100	ALTERNATE NO. 1	1.00	AT One Million, Eight Hundred Twenty Thousand Dollars & no cents	LS Lump Sum 1,820,000	1,820,000
				Subtotal:	
				Total Estimated Alternate No. A01 Price:	1,820,000

Massachusetts Ba[illegible]ansportation Authority
Capital Ma[illegible]ement System
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Alternate No. A02 Line Items

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
0001.200	ALTERNATE NO. 2	1.00	AT Three Hundred Eighty Thousand Dollars & no cents	LS Lump Sum 380,000.00	380,000.00
				Subtotal:	
				Total Estimated Alternate No. A02 Price:	380,000.00

Massachusetts Bay [redacted]nsportation Authority
Capital Ma[redacted]gement System
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Alternate No. A03 Line Items

Item Number	Description	Quantity	Unit Bid Price (written in words)	Unit Price	Amount
[redacted]					
0001.300	ALTERNATE NO. 3	1.00	AT Two Hundred Twenty Five Thousand Dollars + no cents	LS Lump Sum 225,000.00	225,000.00
				[redacted] Subtotal:	
				Total Estimated Alternate No. A03 Price:	225,000.00

A BIDDER WILL NOT BE ELIGIBLE FOR AWARD OF A CONTRACT UNDER THIS INVITATION FOR BIDS UNLESS SUCH BIDDER HAS SUBMITTED AS A PART OF ITS BID THE FOLLOWING CERTIFICATION PERTAINING TO INELIGIBLE CONTRACTORS WHICH WILL BE DEEMED A PART OF THE RESULTING CONTRACT.

A. The J.F. WHITE CONTRACTING CO.
(Name of Individual or Concern submitting this bid)

hereby certifies that **it is not included** on the U.S. Comptroller General's Consolidated **List of Persons or Firms Currently Debarred** for Violations of Various Public Contracts Incorporating Labor Standards Provisions.

OR

B. The _____
(Name of Individual or Concern submitting this bid)

hereby certifies that **it is included** on the U.S. Comptroller General's Consolidated **List of Persons or Firms Currently Debarred** for Violations of Various Public Contracts Incorporating Labor Standards Provisions.

_____
(Signature of authorized representative of Bidder)

KEVIN K. EGAN EXEC. VICE PRES.

It is a condition of this Contract, and shall be made a condition of each subcontract entered into pursuant to this Contract, that the Contractor and any subcontractor shall not require any laborer or mechanic employed in performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his health or safety, as determined under construction safety and health standards (Title 29, Code of Federal Regulations, Part 1518, published in the Federal Register on April 17, 1971) promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act, (83 Stat. 96).

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

The bidder hereby certifies he shall comply with the minority manpower ratio and specific action steps contained in the Appendices of the Supplementary Conditions in this Contract. The Contractor receiving the award of the Contract shall be required to obtain from each of its subcontractors and submit to the Contracting or administering agency prior to the performance of any work under said Contract a certification by said subcontractor, regardless of tier, that it will comply with the minority manpower ratio and specific affirmative action steps contained in these Appendices.

THE BIDDER ALSO CERTIFIES AND ASSURES THAT HE WILL MAKE SUFFICIENT REASONABLE EFFORTS TO MEET THE DISADVANTAGED BUSINESS ENTERPRISE (DBE) STATED GOAL ESTABLISHED FOR THIS CONTRACT.

Full name and address of the individual or concern submitting this bid:

J.F. WHITE CONTRACTING CO.

10 BURR STREET

FRAMINGHAM, MA 01701

Signed: _____ KEVIN K. EGAN

Title: EXEC. VICE PRES.

Date: March 3, 2005

NOTICE: Bid should be signed in ink by a person having proper legal authority, and the person's title should be given, such as "owner" in the case of an individual, "partner" in the case of a general partnership, "president", "treasurer" or other authorized officer in the case of a Corporation.

BIDDERS MUST SET FORTH, ACCURATE AND COMPLETE INFORMATION AS REQUIRED BY THIS SOLICITATION. FAILURE TO DO SO MAY RENDER THE OFFER NONRESPONSIVE OR UNACCEPTABLE.

ATTACH **BID DEPOSIT HERE**

NOTE: If the Bidder is a corporation, indicate state of incorporation; if a partnership, give full Names and addresses of all partners; if an individual, give residential address if different from business address; and if joint ventures, give names and addresses of all firms of the joint venture.

If a **Corporation**

Incorporated in what State: Massachusetts

President: Peter White

Treasurer: Peter White

Secretary: Robert Hoffman

If a **Partnership** (Name all Partners):

Name of Partner:_____

Residence:_____

Name of Partner:_____

Residence:_____

If an **Individual**:

Name:_____

Residence:_____

If an **Individual Doing Business Under a Firm Name:**

Name of Firm:_____

Name of Individual:_____

Business Address:_____

Residence:_____

If a **Joint Venture:**

Name of Venture:_____

Business Address:_____

Name of Firm or Corporation:_____

Address:_____

Name of Firm or Corporation:_____

Address:_____

Name of Firm or Corporation:_____

Address:_____

Name of Firm or Corporation:_____

Address:_____

If any of the joint ventures is a corporation a copy of the vote of the corporation authorizing the joint venture should be attached hereto.

The proposed surety on the bond to be given is:

Name: Travelers Casualty & Surety Company of America

Home office Address: One Tower Square, Hartford CT 06183-6014

Massachusetts Address (If Different): 300 Crown Colony Drive, Quincy MA 02169

AFFIDAVIT

State of Massachusetts)

County Middlesex)

ss. : (Date) 3/03, 2005

The undersigned being duly sworn, deposes and says that he is the
EXEC. VICE PRES.
(sole owner; partner; president, treasurer, or other duly authorized official of a corporation)

of J.F. WHITE CONTRACTING CO.
(Name of bidders as appearing in submitted bid)

for work in East Boston (City / Town) on 3/3/05 (opening date of bids);

and certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

KEVIN K. EGAN
EXEC. VICE PRES.
Signature and Title of Person making Affidavit

Sworn to before me this
2nd day of March 2005

Lecia C. Shronce
Notary Public
Commonwealth of Massachusetts
My Commission Expires
February 11, 2011
Notary Public

BUY AMERICA CERTIFICATE

Certification of Compliance With Section 165(a)

The Bidder hereby certifies that it will comply with the requirements of section 165(a) of the Surface Transportation Assistance Act of 1982, as amended, and the regulations in 49 CFR 661.

Date: March 3, 2005

Signature: KEVIN K. EGAN

Company Name: J.F. WHITE CONTRACTING CO.

Title: EXEC. VICE PRES.

OR

Certification for Non-Compliance With Section 165(a)

The Bidder hereby certifies that it cannot comply with the requirements of Section 165(a) of the Surface Transportation Assistance Act of 1982, as amended, but it may qualify for an exception to the requirement pursuant to Section 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act of 1982 and regulations in 49 CFR 661.7.

Date: _____

Signature: _____

Company Name: _____

Title: _____

A BIDDER WILL NOT BE ELIGIBLE FOR AWARD OF ANY CONTRACT UNDER THIS INVITATION FOR BIDS UNLESS SUCH BIDDER HAS SUBMITTED AS PART OF ITS BID THE FOLLOWING CERTIFICATION WHICH WILL BE DEEMED A PART OF THE RESULTING CONTRACT.

RIGHT-TO-KNOW LAW

CERTIFICATION

The Bidder hereby certifies that, if awarded this Contract, he will fully comply with the Massachusetts Right-to-Know Law, c. 470 of the Acts of 1983, (the Act.). In addition, he shall:

1. Obtain a Material Safety Data Sheet, (MSDS), for all substances or mixtures of substances which appear on the Massachusetts Substance List that he or any of his subcontractors brings to or uses on the worksite and will keep a copy of that MSDS on the worksite of this Contract.

2. Label each container of a substance or mixture of substances on the Massachusetts Substance List as required in §7 of the Act.

3. Provide the same training and non-technical instruction that he is required to provide under §15 of the Act to all MBTA employees who are exposed to the substance or to the mixture of substances. Training shall include instruction on the nature and effects of any substance or mixture of substances listed on the Massachusetts Substance List which the Bidder or any of his subcontractors brings to or uses on the worksite.

4. Provide to MBTA employees on the worksite the same protective equipment that the Bidder or any of his subcontractors provides to his employees.

Kevin K. Egan KEVIN K. EGAN EXEC. VICE PRES.

Signature of Authorized Representative of Bidder

J.F. WHITE CONTRACTING CO. 10 BURR STREET FRAMINGHAM, MA 01701

Name and Address of Bidder

CERTIFICATION OF DUMPING FACILITIES

I, J.F. WHITE CONTRACTING CO.

certify that I have adequate dumping facilities available at; Stoughton + Quincy

and that these facilities will be used in connection with work undertaken on this Contract and that such use will be in a manner compliant with State and Local requirements.

K. K. Egan KEVIN K. EGAN EXEC. VICE PRES.

Signature of Authorized Representative Bidder

J.F. WHITE CONTRACTING CO. 10 BURR STREET FRAMINGHAM, MA 01701

Name and Address of Bidder:

March 3, 2005

Date

CERTIFICATION OF EXAMINATION

OF

AVAILABLE SUBSURFACE DATA

Bidder certifies that it has either examined (yes) or not examined (no) the available Subsurface Conditions Data listed in Article 1.04 of the Instruction to Bidders as follows:

A. GEOTECHNICAL

1. Maverick Station Modernization Project-Geotechnical Data Report; dated August, 2003:

   Yes ✓ No ___

B. ENVIRONMENTAL

1. Asbestos and Lead-Based Paint Survey-MBTA Blue Line Maverick Station; Dated September 17, 1999:

   Yes ✓ No ___

2. Soil Sampling Results – Maverick Station. ATC Associates, October, 2003

   Yes ✓ No ___

K. K. Egan KEVIN K. EGAN EXEC. VICE PRES.

Signature of Authorized Representative of Bidder

J.F. WHITE CONTRACTING CO.

Name of Firm or Corporation

10 BURR STREET FRAMINGHAM, MA 01701

Business Address

March 2, 2005

Date

CERTIFICATION REGARDING DEBARMENT. SUSPENSION INELIGIBILITY AND VOLUNTARY EXCLUSION

The Primary Participant (potential contractor for a major third party contract) certifies to the best of its knowledge and belief, that it, and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency.

2. Have not within a three-year period preceding this bid been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph, (2) of this certification; and

4. Have not within a three-year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause of default.

If the Primary Participant (potential contractor for a major third party contract) is unable to certify to any of the statements in this certification with respect to it or its principals, the Bidder shall attach an explanation to this certification).

THE PRIMARY PARTICIPANT (POTENTIAL CONTRACTOR FOR A MAJOR THIRD PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

Primary Participant: _____
Signature

EXEC. VICE PRES.
Title of Authorized Official

The undersigned chief legal counsel for the J.F. WHITE CONTRACTING CO. hereby certifies

that KEVIN K. EGAN (Authorized Official) has authority under State and local law to comply with the

subject assurances and that the certification above has been legally made.

_____
Signature of Applicant's Attorney

11/15/04
Date

CERTIFICATION REGARDING DEBARMENT, SUSPENSION INELIGIBILITY AND VOLUNTARY EXCLUSION

Primary Covered Transactions

1. By signing and submitting this Proposal the prospective participant is providing the certification in accordance with 49 CFR Part 29.

2. The inability of a person to provide the certification will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of this prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

3. The certification is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

4. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if at any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

5. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this agreement.

6. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -Lower Tier Covered Transaction", without modification, in all lower tier covered transactions and in all solicitations for lowered tier covered transactions.

7. Except for transactions authorized under paragraph (5) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION INELIGIBILITY AND VOLUNTARY EXCLUSION

The Lower Tier Participant (potential third party contractor or potential subcontractor under a third party contract) certifies by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or Voluntarily excluded from covered transactions by any Federal, State or local department or agency.

If the Lower Tier Participant (potential third party contractor or potential subcontractor under a third party contract) is unable to certify to any of the statements in this certification, such Participant shall attach an explanation to this Proposal.

THE LOWER TIER PARTICIPANT (POTENTIAL THIRD PARTY CONTRACTOR OR POTENTIAL SUBCONTRACTOR UNDER A THIRD PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

Lower Tier Participant _____
(Signature)

_____
(Title)

CERTIFICATION REGARDING DEBARMENT, SUSPENSION INELIGIBILITY AND VOLUNTARY EXCLUSION

"INSTRUCTIONS FOR CERTIFICATION"

Lower Tier Covered Transactions

1. By signing and submitting this proposal the prospective lower tier participant is providing the certification in accordance with 49 CFR Part 29.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

4. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

5. The prospective lower tier participation further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions", without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

6. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is nor debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may check the Nonprocurement List.

7. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

8. Except for transactions authorized under paragraph (4) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

CERTIFICATION OF RESTRICTIONS ON LOBBYING

No Federal appropriated funds have been paid, or will be paid, by or on behalf of the undersigned, to any person for the influencing or the attempting to influence an officer or employee of any agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant the making of any Federal loan, the entering of any cooperative agreement and the extension, continuation, renewal, Amendment, or modification of any cooperative of any Federal contract, grant, loan or agreement.

THE PRIMARY PARTICIPANT (POTENTIAL CONTRACTOR FOR A MAJOR THIRD PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

Primary participant: K. Egan KEVIN K. EGAN
Signature

EXEC. VICE PRES.
Title of Authorized Official

The undersigned chief legal counsel for the J.F. WHITE CONTRACTING CO. hereby certifies that KEVIN K. EGAN (Authorized Official) has authority under State and local law to comply with the subject assurances and that the certification above has been legally made.

Signature of Applicant's Attorney

11/15/04
Date

CERTIFICATION OF YEAR 2000 COMPLIANCE

I, J.F. WHITE CONTRACTING CO.
hereby certify that all components, systems, assemblies, and/or elements of the deliverable under this contract contain no elements/components which have not been tested for and found compliant with proper operation in Year 2000. All deliverables containing devices, equipment, processors or other components which use and/or process dates and times are affirmed to be Year 2000 compliant.

KEVIN K. EGAN EXEC. VICE PRES.
Signature of Authorized Representative/Bidder

J.F. WHITE CONTRACTING CO. 10 BURR STREET FRAMINGHAM, MA 01701
Name and Address of Bidder

March 3, 2005
Date

CERTIFICATION OF CONSTRUCTION EQUIPMENT STANDARD COMPLIANCE

I, J.F. WHITE CONTRACTING CO.

Hereby certify that all diesel construction equipment used in this contract has emission control devices installed, such as oxidation catalysts or particulate filters on the exhaust system side of the diesel combustion engine equipment.

K. K. Egan KEVIN K. EGAN EXEC. VICE PRES.

Signature of Authorized Representative/Bidder

J.F. WHITE CONTRACTING CO. 10 BURR STREET FRAMINGHAM, MA 01701

Name and Address of Bidder

March 3, 2005

Date

Form A

SCHEDULE OF PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISE
(TO BE ATTACHED TO THE BID FORM)

PROJECT No. S10CN04 LOCATION BOSTON

J.F. WHITE CONTRACTING CO.,
(NAME OF PRIME BIDDER)

NAME OF DISADVANTAGED BUSINESS ENTERPRISE	ADDRESS	TYPE OF WORK AND CONTRACT ITEMS OR PARTS THEREOF TO BE PERFORMED	PROJECTED START AND FINISH DATE FOR WORK	AGREED PRICE
ATLANTIC BRIDGE ENGINEERING		F & I STRUCTURAL STEEL		1,070,000
CAPCO		F & I SPECIALTY METAL		1,000,000
MOHAWK CONSTRUCTION		F & I RESTEEL		768,000
KC ELECTRIC		ELECTRIC (PARTIAL)		600,000
DAGLE		TRAFFIC SIGNALS		89,000
WILDECA		PAVING		300000
McCOY FENCE		FENCING		110,000

A COPY OF THE DBE'S MOST RECENT CERTIFICATION AND AN ORIGINAL AFFIDAVIT MUST BE ATTACHED TO THIS SCHEDULE

Form A

SCHEDULE OF PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISE
(TO BE ATTACHED TO THE BID FORM)

PROJECT No. S10CN04 LOCATION BOSTON

J.F. WHITE CONTRACTING CO.,
(NAME OF PRIME BIDDER)

NAME OF DISADVANTAGED BUSINESS ENTERPRISE	ADDRESS	TYPE OF WORK AND CONTRACT ITEMS OR PARTS THEREOF TO BE PERFORMED	PROJECTED START AND FINISH DATE FOR WORK	AGREED PRICE
PEPENDABLE MASONRY		MASONRY		1,000,000
COSTA'S TRUCKING		TRUCKING		150,000
GROTEK ENGINEERING		INSTRUMENTATION, NOISE, PRECON. SURVEY		160,000
STAFFORD CONSTR. SERVICES		DRYWALL		39,000

A COPY OF THE DBE'S MOST RECENT CERTIFICATION AND AN ORIGINAL AFFIDAVIT MUST BE ATTACHED TO THIS SCHEDULE

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

_____	an individual	✓	DBE
_____	a partnership	_____	a joint venture
_____	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
F.I.L
STRUCTURAL & MISC METALS
at the following price: 1,070,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 2/2/05

Atlantic Bridge & Engineering Inc.
Name of Disadvantaged Business Enterprise

By _____

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF Massachusetts (Date 2/2/05)

COUNTY OF Essex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

Treasurer (sole owner; partner;
president; treasurer; or other duly authorized official of a corporation)

of Atlantic Bridge & Engineering, Inc.
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Atlantic Bridge & Engineering, Inc.
(Name of DBE)

[signature] Treasurer
(Signature and Title of Person Making Affidavit)

Sworn to before me this 2nd day of February 2005

[signature]
(Notary Public)

JULIE AUDRA BOCCELLI
MY COMMISSION EXPIRES JULY 28, 2011
NOTARY PUBLIC
COMMONWEALTH OF MASSACHUSETTS

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

CORRECTION LETTER
Please disregard letter sent August 2, 2004

August 3, 2004

Ms. Victoria Kolenda
ATLANTIC BRIDGE & ENGINEERING INC
191 Elm Street, Room 7, Box 10
Salisbury, MA 01952

Dear Ms. Kolenda:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 238120** with the certified business description, **SUPPLIER: LABOR FOR STRUCTURAL STEEL ERECTION, INSTALLATION OF CONCRETE REINFORCING STEEL ERECTION OF CONCRETE BOX BEAMS.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an un-sworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **August 22, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **ATLANTIC BRIDGE & ENGINEERING INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **ATLANTIC BRIDGE & ENGINEERING INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **ATLANTIC BRIDGE & ENGINEERING INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **ATLANTIC BRIDGE & ENGINEERING INC** meets Small Business Administration (SBA) criteria for being a small business concern

and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC 1368 IR
Fldbernu

V. Form B

MBTA Contract No. S10CN04
Description MAVERICK SQUARE STATION

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: _____
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

_____ an individual	✓ DBE
_____ a partnership	_____ a joint venture
_____ a corporation	

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project, (Specify in detail particular work items or parts thereof to be performed):

SPEC'L METALS

at the following price: 1,000,000.-

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 3/2/05

CAPCO CONTRACTING
Name of Disadvantaged Business Enterprise

By _____
THOMAS COUSAR, PRESIDENT

V. Form C

MBTA Contract No: S10CN04
Description: MAVERICK SQUARE STATION

DBE AFFIDAVIT

STATE OF PA (Date 3/2/05)

COUNTY OF Allegheny S.S.

The undersigned being duly sworn, deposes and says that he/she is the

PRESIDENT (sole owner; partner; president; treasurer; or other duly authorized official of a corporation)

of CAPCO CONTRACTING (Name of DBE)

and certifies that since the date of its certification by

SOMWBA (SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of CAPCO CONTRACTING (Name of DBE)

(Signature and Title of Person Making Affidavit)

Sworn to before me this 2nd day of March 20 05

Catherine L Bradish
(Notary Public)

NOTE: The Bidder must attach the DBEs most recent certification letter to this affidavit.

Notarial Seal
Catherine L. Bradish, Notary Public
City of McKeesport, Allegheny County
My Commission Expires June 11, 2005

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

November 5, 2004

Mr. Thomas Cousar
CAPCO CONTRACTING CO INC
3711 Walnut Street
McKeesport, PA 15132

Dear Mr. Cousar:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC) is pleased to notify you that your company has been renewed as a disadvantaged business enterprise (DBE). Your company continues to be assigned NAICS Code(s) 238320 AND 238310 with the certified business description, **PAINTING, DRYWALL, INTERIORS AND RELATED.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of October 20, 2005, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **CAPCO CONTRACTING CO INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **CAPCO CONTRACTING CO INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **CAPCO CONTRACTING CO INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **CAPCO CONTRACTING CO INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

A signed copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship;

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1413 PA/PL
Fidbernu

RECEIVED
NOV - 9 2004

Form B

MBTA Contract No. S10CN04
Description Maverick Station

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. WHITE CONTRACTING CO.
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

_____	an individual	X	DBE
_____	a partnership	_____	a joint venture
X	a corporation		

The Disadvantaged Business status of the undersigned is confirmed
a. on the reference list of Disadvantaged Business Enterprises dated _____, or
b. on the attached Disadvantaged Business Enterprise identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):

FAI RESTEEL

at the following price: 768000.

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 11/9/04

MOhawk Construction CO., Inc.
Name of Disadvantaged Business Enterprise

By _____
Peter F. Norton, PResident

Form C

MBTA Contract No. S10CN04
Maverick Station

DBE AFFIDAVIT

STATE OF Massachusetts (Date 11/9/04

COUNTY OF Middlesex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

President
(sole owner; partner; president; treasurer; or other duly authorized official of a corporation)

of Mohawk Construction Co., INc.
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of (Name of DBE) Mohawk Construction Co., Inc.

(Signature and Title of Person Making Affidavit) Peter F. Norton, PResident

Sworn to before me this 9th day of November 20 04

(Notary Public)

NOTARY PUBLIC MICHAEL A. MS COMMONWEALTH OF MASSACHUSETTS MY COMMISSION EXPIRES MAY 17 2007

NOTE: The Bidder must attach the DBEs most recent certification letter or document to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

April 23, 2004

Mr. Peter Norton
MOHAWK CONSTRUCTION COMPANY INC
1501 Main Street, Unit 8
Tewksbury, MA 01876

Dear Mr. Norton:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 238120** with the certified business description of **INSTALLATION OF REINFORCING STEEL.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **April 22, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **MOHAWK CONSTRUCTION COMPANY INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **MOHAWK CONSTRUCTION COMPANY INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **MOHAWK CONSTRUCTION COMPANY INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **MOHAWK CONSTRUCTION COMPANY INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1303 IR
ldbemu

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

____	an individual	____/____	DBE
____	a partnership	____	a joint venture
____/____	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated 11/2007, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project, (Specify in detail particular work items or parts thereof to be performed):

ELECTRIC (PARTIAL)

at the following price: 1,000,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
____	____	____
____	____	____
____	____	____

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 2/3/05

H.C. Electric Co Inc
Name of Disadvantaged Business Enterprise

By Kimberly A. Cohen

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF New Hampshire (Date 2/3/05)
COUNTY OF Rockingham S.S.

The undersigned being duly sworn, deposes and says that he/she is the

President
president; treasurer; or other duly authorized official of a corporation) (sole owner; partner;

of KG Electric Co Inc
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of KG Electric Co Inc
(Name of DBE)

Kimberly A Cohen President
(Signature and Title of Person Making Affidavit)

Sworn to before me this 3 day of February 05

Fred W Carter
FRED W. CARTER, Notary Public (Notary Public)
My Commission Expires October 9, 2007

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
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MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

October 29, 2004

Ms. Nancy Cohen and Ms. Kimberly Cohen-Glasheen
K C ELECTRIC COMPANY INC
10 Primrose Lane
Salem, NH 03079

Dear Ms. Cohen And Ms. Cohen-Glasheen:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 238210** with the certified business description, **ELECTRICAL CONTRACTING.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **November 27, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **K C ELECTRIC COMPANY INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **K C ELECTRIC COMPANY INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **K C ELECTRIC COMPANY INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **K C ELECTRIC COMPANY INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A **signed** copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship;

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

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.Jbernu

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

____	an individual	✓	DBE
____	a partnership	____	a joint venture
✓	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated 3/05/04, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):

Traffic Signal Work

at the following price: 89,000.00

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 3/2/05

Dagle Electrical Construction Corp.
Name of Disadvantaged Business Enterprise

By _____

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF Massachusetts (Date 3/2/05)

COUNTY OF Middlesex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

President (sole owner; partner; president; treasurer; or other duly authorized official of a corporation)

of Dagle Electrical Construction Corp. (Name of DBE)

and certifies that since the date of its certification by

SOMWBA (SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Dagle Electrical Construction Corp (Name of DBE)

[signature], President (Signature and Title of Person Making Affidavit)

Sworn to before me this 2nd day of March 2005.

[signature] My commission expires 9/24/2010 (Notary Public)

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

TELEPHONE: (617) 973-8692
FACSIMILE: (617) 973-8637

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

BARBARA B. BERKE
DIRECTOR

DAVIDA CRAIG CELESTIN
EXECUTIVE DIRECTOR

March 5, 2004

Ms. Maureen Dagle, President
DAGLE ELECTRICAL CONSTRUCTION CORP
P O Box 982
Melrose, MA 02176

Dear Ms. Dagle:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)**, is pleased to notify you that your company was reviewed clarification of your business description. Your company's primary economic activity as a **disadvantaged business enterprise (DBE)** is identified as **NAICS Code(s) 517910, 237110 AND 234910.** For clarification, your business description is **COMMERCIAL, RESIDENTIAL AND INDUSTRIAL CONSTRUCTION FOR TELECOMMUNICATIONS DATA, MAINTENANCE AND SITE UTILITIES, TRAFFIC SIGNAL INSTALLATION AND MAINTENANCE.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **May 2, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **DAGLE ELECTRICAL CONSTRUCTION CORP** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **DAGLE ELECTRICAL CONSTRUCTION CORP** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **DAGLE ELECTRICAL CONSTRUCTION CORP** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **DAGLE ELECTRICAL CONSTRUCTION CORP** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million." and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors, please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. For manufacturers, retailers and wholesalers, a notarized statement of the number of full-time and part-time employees for each fiscal year for the most recent three (3) years.

Additionally, every six years, all certified DBEs that wish to remain certified must undergo a substantive review of their certification status with a SOMWBA certification specialist who will re-evaluate the company to determine whether it continues to meet the applicable certification criteria. If you wish to recertify your company when it becomes due for substantive review, you will need to submit a Statement of Disadvantage and a Personal Financial Statement and all required information and documentation to SOMWBA no later than 30 days prior to the date of certification expiration (i.e., the recertification date).

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have any further questions regarding requirements for remaining in good standing, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1268 SI1/TE
Fldbedr

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

	an individual	✓	DBE
	a partnership		a joint venture
✓	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
PAVING

at the following price: $300,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 2/10/05

WILDECA CORPORATION
Name of Disadvantaged Business Enterprise

By _____

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF MASSACHUSETTS (Date 2/3/05)

COUNTY OF SUFFOLK S.S.

The undersigned being duly sworn, deposes and says that he/she is the

PRESIDENT (sole owner; partner;
president; treasurer; or other duly authorized official of a corporation)

of WILDECA CORPORATION
(Name of DBE)

and certifies that since the date of its certification by

SOMBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of WILDECA CORPORATION
(Name of DBE)

PRESIDENT
(Signature and Title of Person Making Affidavit)

Sworn to before me this 3RD day of FEBRUARY 20 05

(Notary Public)

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
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MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

August 27, 2004

Mr. Wilson K. DeCastro
WILDECA CORPORATION
P.O. Box 365677
Hyde Park, MA 02136

Dear Mr. DeCastro:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 237310** with the certified business description, **BITUMINOUS CONCRETE, CURBING, EXCAVATION, TRUCK RENTAL AND SIDEWALK CONSTRUCTION.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **September 1, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **WILDECA CORPORATION** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **WILDECA CORPORATION** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **WILDECA CORPORATION** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **WILDECA CORPORATION** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A **signed** copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship;

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
tification Committee

CC1384 CM/PV/TK
Fldbernu

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

_____	an individual	_____	DBE
_____	a partnership	_____	a joint venture
X	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project, (Specify in detail particular work items or parts thereof to be performed):

FENCING

at the following price: $110,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 3/2/05

Diccy Fence Inc
Name of Disadvantaged Business Enterprise

By Gaetano Amelio

V. Form C

MBTA Contract No: S10CN04
Description: Maverick Station, East Boston,

DBE AFFIDAVIT

STATE OF Massachusetts (Date 3/2/05)

COUNTY OF Suffolk S.S.

The undersigned being duly sworn, deposes and says that he/she is the

Yolanda A Nelson (sole owner; partner;
president; treasurer; or other duly authorized official of a corporation)

of Mercy Fence, Inc
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Mercy Fence, Inc
(Name of DBE)

Yolanda A Nelson
(Signature and Title of Person Making Affidavit)

Sworn to before me this 3rd day of March 2005

[signature] Commission expires March 19, 2010
(Notary Public)

NOTE: The Bidder must attach the DBEs most recent certification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
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E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

October 21, 2004

Mr. Ralph McCoy
MCCOY FENCE INC
14 Baird Street
Dorchester, MA 02124

Dear Mr. McCoy:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 237310 AND 238990** with the certified business description, **FENCING AND GUARDRAIL INSTALLATION.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **October 1, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **MCCOY FENCE INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **MCCOY FENCE INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **MCCOY FENCE INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **MCCOY FENCE INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

A **signed** copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship;

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

1408 FG
Hdbernu

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vent

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

____	an individual	___x___	DBE
____	a partnership	____	a joint venture
___x___	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
MASONARY

at the following price: 1,003,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
x		

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 3-2-2005

Dependable Masonry Construction Company Inc.
Name of Disadvantaged Business Enterprise

By _____

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF Massachusetts (Date 3-2-2005)

COUNTY OF Middlesex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

Treasurer (sole owner, partner, president; treasurer; or other duly authorized official of a corporation)

of Dependable Masonry Construction Company Inc.
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Dependable Masonry Construction Company Inc.
(Name of DBE)

Pauline Henry Treasurer
(Signature and Title of Person Making Affidavit)

Sworn to before me this 2 day of March 2005

Greta Cohen
(Notary Public)

MY COMMISSION EXPIRES ON
11.22.07

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

May 27, 2004

Mr. Edmund Henry
DEPENDABLE MASONRY CONSTRUCTION COMPANY INC
73 Concord Street
North Reading, MA 01864

Dear Mr. Henry:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 238140, 236220 AND 236115** with the certified business description, **GENERAL BUILDING CONTRACTOR· RESIDENTIAL AND COMMERCIAL CONSTRUCTION, SPECIALIZING IN MASONRY AND BRICKPAVING.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an un-sworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **June 1, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **DEPENDABLE MASONRY CONSTRUCTION COMPANY INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **DEPENDABLE MASONRY CONSTRUCTION COMPANY INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **DEPENDABLE MASONRY CONSTRUCTION COMPANY INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **DEPENDABLE MASONRY CONSTRUCTION COMPANY INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have further questions regarding renewals, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1325 CM
Fldbemu

V. Form B

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J.F. White Contracting Company
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

____	an individual	____X____	DBE
____	a partnership	____	a joint venture
____✓____	a corporation		

The Disadvantaged Business status of the undersigned is confirmed
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
TRUCKING

at the following price: $ 65.00 per Hour $150,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
Trucking		

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 11/30/04

Costa's Trucking Inc
Name of Disadvantaged Business Enterprise

By _____

V. Form C

MBTA Contract No. S10CN04
Description Blue Line Modernization Project
Maverick Square Station & Vents

DBE AFFIDAVIT

STATE OF Mass. (Date 11-30-04)

COUNTY OF Bristol SS

The undersigned being duly sworn, deposes and says that he/she is the

President (sole owner; partner, president; treasurer; or other duly authorized official of a corporation)

of Costa's Trucking Inc. (Name of DBE)

and certifies that since the date of its certification by

Somba (SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Costa's Trucking Inc. (Name of DBE)

Peter Costa President (Signature and Title of Person Making Affidavit)

Sworn to before me this 30 day of November 2004

Melissa M Thomas (Notary Public)

NOTE: The Bidder must attach the DBEs most recent recertification letter to this affidavit

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

BARBARA B. BERKE
Director

DAVIDA CRAIG CELESTIN
Executive Director

TELEPHONE
(617) 973-8692

FACSIMILE
(617) 973-8637

April 22, 2004

Mr. Peter Costa, President
COSTA'S TRUCKING INC
FKA: PETER COSTA DBA: COSTA'S TRUCKING
111 Gammons Road
Acushnet, MA 02743

Dear Mr. Costa:

Congratulations on your certification! The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC),** wishes to acknowledge receipt of your certification documents. We are pleased to notify you that your company has been **certified** as a disadvantaged business enterprise (DBE). Your company's primary economic activity is identified as **NAICS Code(s) 484220,** with the certified business description, **TRUCKING; HAULING OF GRAVEL, ASPHALT, TOP SOIL AND STONE.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid projects. In the event of any change affecting the ownership, control or independence of your firm, please notify SOMWBA for a DBE review and re-evaluation. SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **April 16, 2005,** and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **COSTA'S TRUCKING INC FKA: PETER COSTA DBA: COSTA'S TRUCKING** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **COSTA'S TRUCKING INC FKA: PETER COSTA DBA: COSTA'S TRUCKING** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **COSTA'S TRUCKING INC FKA: PETER COSTA DBA: COSTA'S TRUCKING** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **COSTA'S TRUCKING INC FKA: PETER COSTA DBA: COSTA'S TRUCKING** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million." and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties)

control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. A notarized statement of the number of full-time and part-time employees for each fiscal year.

Additionally, every six years, all certified DBEs that wish to remain certified must undergo a substantive review of their certification status with a SOMWBA certification specialist who will re-evaluate the company to determine whether it continues to meet the applicable certification criteria. If you wish to recertify your company when it becomes due for substantive review, you will need to submit a Statement of Disadvantage and a Personal Financial Statement and all required information and documentation to SOMWBA no later than 30 days prior to the date of certification expiration (i.e., the recertification date).

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1299
dbe

Form B

MBTA Contract No. S10CN04
Description Maverick Station

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: J. F. White
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

	an individual	✓	DBE
	a partnership		a joint venture
V	a corporation		

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated _____, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
INSTRUMENTATION, NOISE, PRE-CON SURVEY

at the following price: $160,000

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 1/10/05

Geotek Engineering, Inc
Name of Disadvantaged Business Enterprise

By M. Mahoney

V. Form C

MBTA Contract No: S10CN04
Description: Malden Square Station

DBE AFFIDAVIT

STATE OF Massachusetts (Date 1/10/05

COUNTY OF Middlesex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

President (sole owner; partner;
president; treasurer; or other duly authorized official of a corporation)

of Geotek Engineering, Inc
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Geotek Engineering, Inc
(Name of DBE)

Julie Sigal President
(Signature and Title of Person Making Affidavit)

Sworn to before me this 3 day of February 2005

D. Bolduc
(Notary Public)

NOTE: The Bidder must attach the DBEs most recent certification letter to this affidavit.

MASSACHUSETTS ALL-PURPOSE ACKNOWLEDGMENT

Gov. Exec. Ord. #455 (03-13), § (d)

Commonwealth of Massachusetts
County of Middlesex } ss.

On this the 3 (Day) day of February (Month), 2005 (Year), before me,

Dariya Bolkhovsky (Name of Notary Public) the undersigned Notary Public,

personally appeared Julia Grigalovsky (Name(s) of Signer(s)),

proved to me through satisfactory evidence of identity, which was/were

personal knowledge (Description of Evidence of Identity),

to be the person(s) whose name(s) is/are signed on the preceding or attached document, and acknowledged to me that he/she/they signed it voluntarily for its stated purpose(.)

☐ as partner(s) for N/A (Name of Partnership), a partnership.

☒ as President (Title of Office) for Gotek Engineering Inc. (Name of Corporation) a corporation.

☐ as attorney in fact for N/A (Name of Principal Signer), the principal.

☐ as N/A (Type of Capacity) for _____ (Name of Person/Entity), a/the _____ (Type of Entity).

DARIYA BOLKHOVSKY
Notary Public
Commonwealth of Massachusetts
My Commission Expires Feb 21, 2008

D. Bolkhovsky
Signature of Notary Public

DARIYA BOLKHOVSKY
Printed Name of Notary

My Commission Expires February 21, 2008

Place Notary Seal and/or Any Stamp Above

OPTIONAL

Although the information in this section is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Right Thumbprint of Signer
Top of thumb here

Description of Attached Document

Title or Type of Document: DBE Affidavit

Document Date: 01/10/05 Number of Pages: 1

Signer(s) Other Than Named Above: _____

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COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

TELEPHONE:
(617) 973-8692

FACSIMILE:
(617) 973-8637

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

BARBARA B. BERKE
DIRECTOR

DAVIDA CRAIG CELESTIN
EXECUTIVE DIRECTOR

March 5, 2004

Dr. Julia Sigalovsky
GEOTEK ENGINEERING INC
15 Beulah Street
Framingham, MA 01701

Dear Dr. Sigalovsky:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC) is pleased to notify you that your company has been renewed as a disadvantaged business enterprise (DBE). Your company continues to be assigned NAICS Code(s) 541620 AND 541330 with the certified business description of CONSULTANT FOR GEOTECHNICAL INSTRUMENTATION AND GEOPHYSICAL SURVEY, PHASE I AND II ENVIRONMENTAL SITE ASSESSMENT, CONTAMINATION SITE REMEDIATION, HAZARDOUS MATERIAL HANDLING, MONITORING AND DISPOSAL, HEALTH AND SAFETY PLANNING, WRITING AND IMPLEMENTATION, DRILLING AND TEST BORING.

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an unsworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of March 9, 2005, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by GEOTEK ENGINEERING INC owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in GEOTEK ENGINEERING INC circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the GEOTEK ENGINEERING INC has submitted a notice of change' to SOMWBA). I/we also affirm that GEOTEK ENGINEERING INC meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors: please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship: and/or

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have any further questions regarding requirements for remaining in good standing, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1271 CO/ES/EN
Fldbernu

V. **Form B**

MBTA Contract No. S10CN04 Maverick Staion
Description Renovation to the Existing Station

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: JF White Contracting Co.

(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

____ an individual	___X___ DBE
____ a partnership	____ a joint venture
____ a corporation	

The Disadvantaged Business status of the undersigned is confirmed:
(a) on the reference list of Disadvantaged Business Enterprises dated 2/1/05, or
(b) on the attached Disadvantaged Business Enterprise Identification Statement.

The undersigned is prepared to perform the following work in connection with the above project,
(Specify in detail particular work items or parts thereof to be performed):
Metal Framing, Gypowsun wallboard, lath and plaster

at the following price: $14,000 lump Sum Section 09220
$25,000 lump Sum Section 09250

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
0910.000	2005	2006
0926.000	2005	2006

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date 11/18/04

Stafford Construction Services, Inc.
Name of Disadvantaged Business Enterprise

By Susan A. Stafford, Pres

V. Form C

MBTA Contract No: #S10CN04MBTA Blue Line
Description : Renov. Maverick Station

DBE AFFIDAVIT

STATE OF Massachusetts (Date 11/18/04)

COUNTY OF Middlesex S.S.

The undersigned being duly sworn, deposes and says that he/she is the

President (sole owner; partner; president; treasurer; or other duly authorized official of a corporation)

of Stafford Construction Services, Inc.
(Name of DBE)

and certifies that since the date of its certification by

SOMWBA
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of Stafford Construction Services, Inc.
(Name of DBE)

Sara A. Stafford, Pres
(Signature and Title of Person Making Affidavit)

Sworn to before me this 18th day of Nov. 2004

Patricia A. Avola
(Notary Public)

PATRICIA A. AVOLA
Notary Public
Commonwealth of Massachusetts
My Commission Expires
February 28, 2008

NOTE: The Bidder must attach the DBEs most recent certification letter to this affidavit.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF BUSINESS AND TECHNOLOGY
STATE OFFICE OF MINORITY AND WOMEN BUSINESS ASSISTANCE
Massachusetts Transportation Building
Ten Park Plaza, Suite 3740, Boston, MA 02116
Internet: http://www.somwba.state.ma.us
E-Mail: webmaster@somwba.state.ma.us

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

BARBARA B. BERKE
DIRECTOR

DAVIDA CRAIG CELESTIN
EXECUTIVE DIRECTOR

TELEPHONE:
(617) 973-8692

FACSIMILE:
(617) 973-8637

January 16, 2004

Ms. Sara Stafford
STAFFORD CONSTRUCTION SERVICES INC
414 Lowell Street
Wakefield, MA 01880

Dear Ms. Stafford:

The State Office of Minority and Women Business Assistance (SOMWBA), acting as certification agent for the **Massachusetts Highway Department (MHD), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (MassPort), the Massachusetts Turnpike Authority/Central Artery/Tunnel (MTA/CA/T) and the Massachusetts Aeronautics Commission (MAC)** is pleased to notify you that your company **has been renewed** as a disadvantaged business enterprise (DBE). Your company continues to be assigned **NAICS Code(s) 238130** with the certified business description of **METAL FRAMING, PLASTERING, DRYWALL, DOOR/HARDWARE INSTALLATION, INSULATING, TAPING.**

Your company's designation as a DBE will appear in the Massachusetts Central Register and the MHD list of DBEs eligible for federal-aid transportation projects. As a DBE, you must inform SOMWBA in writing of any change in circumstances affecting your ability to meet size, disadvantaged status, ownership, control requirements or any material change in the information provided in your application form. Changes in management responsibility among members of a limited liability company are covered by this requirement. You must attach supporting documentation describing in detail the nature of such changes. The notice must take the form of an affidavit sworn to by the owners of the firm before a person who is authorized by state law to administer oaths or of an un-sworn declaration executed under penalty of perjury of the laws of the United States. You must provide the written notification within 30 days of the occurrence of the change. If you fail to make timely notification of such a change, you will be deemed to have failed to cooperate under 49 CFR 26.109(c). SOMWBA reserves the right to monitor, perform random spot checks, re-evaluate the firm or revoke the firm's certification if it no longer meets the certification criteria.

To renew your firm's DBE certification and if it continues to meet the applicable criteria, on or before your firm's certification anniversary date of **February 1, 2005**, and each year thereafter, please send SOMWBA the following documents:

1. A notarized affidavit sworn to by **STAFFORD CONSTRUCTION SERVICES INC** owner(s) that indicates: "I/we certify under the pains and penalties of perjury of the laws of the United States that there have been no changes in **STAFFORD CONSTRUCTION SERVICES INC** circumstances affecting its ability to meet size, disadvantaged status, ownership, or control requirements 49 CFR Part 26 or any material changes in the information provided in the firm's application form, (except for changes about which the **STAFFORD CONSTRUCTION SERVICES INC** has submitted a 'notice of change' to SOMWBA). I/we also affirm that **STAFFORD CONSTRUCTION SERVICES INC** meets Small Business Administration (SBA) criteria for being a small business concern and its average annual gross receipts (as defined by SBA rules) over the firm's previous three fiscal years do not exceed $17.4 million"; and

2. A copy of the company's, and all of its affiliates', U.S. Tax Returns including all schedules and attachments for the most recent three (3) years. (Sole proprietors; please include copies of the Schedule C.) Concerns are affiliates of each other when either directly or indirectly (1) one concern controls or has the power to control the other, (2) a third-party (or parties) control(s) or has the power to control both, or (3) an identity of interest between or among parties exist such that affiliation may be found. In determining whether affiliation exists, consideration shall be given to such factors as: common ownership, common management, contractual relationship; and/or

3. A notarized statement of the number of full-time and part-time employees (including owner) for each year indicated.

We appreciate your submitting these documents for our confidential review. If your company has any change in circumstances affecting its ability to meet size, disadvantaged status, or ownership and control criteria of 49 CFR Part 26 or of any material changes in the information provided with the firm's application for certification or changed address or telephone number, please contact our office within thirty days of the change in writing on company letterhead.

During the period of your certification, if you have any further questions regarding requirements for remaining in good standing, please contact Ms. Nedra D. White, SOMWBA/DBE Renewal Specialist, at (617)973-8648.

Very truly yours,

Sandra H. Smith
Certification Committee

CC1243 CA/PL
Fldbernu

J. F. WHITE CONTRACTING COMPANY

At a meeting of the Board of Directors of the J.F. White Contracting Company held on September 7, 2004 at 10 Burr Street, Framingham, Massachusetts, at which all the Directors were present or waived notice,

It was VOTED that Kevin K. Egan, Executive Vice President/Chief Engineer of this corporation, be and is hereby authorized to execute contracts, releases and bonds in the name and behalf of said company, and affix its corporate seal thereto; and such execution of any contract or obligation in this company's name on its behalf by such Kevin K. Egan under the seal of the company, shall be valid and binding upon this company.

A True Copy,

Attest: _____
Robert E. Hoffman, Clerk

Framingham, Massachusetts
September 8, 2004

I hereby certify that I am the Clerk of the J.F. White Contracting Company, that Kevin K. Egan is the duly elected Executive Vice President/Chief Engineer of said company, and that the above vote has not been amended or rescinded and remains in full force and effect as of this date.

_____
Robert E. Hoffman, Clerk

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BIDDERS CHECKLIST FOR INFORMATION ONLY

MBTA Contract No. S10CN04, **Blue Line Modernization Project, Maverick Square Station and Blue Line Vents**

This checklist is provided to assist Bidders in determining that required signatures and submittals are included along with the Bid Proposal.

	ITEM	REFERENCE PAGE	ACTION REQUIRED
1	Addenda acknowledged	15B	Acknowledge all addenda issued
2	Letter of Commitment furnished from proposed surety	Not applicable	Attach letter
3	Certification pertaining to ineligible contractors completed	18B	Bidder's authorized signature
4	Right-To-Know law Certification	24B	Bidder's authorized signature
5	Certification of Dumping Facilities completed	25B	Data and Bidder's authorized signature
6	Certification of Examination of Available Subsurface Data completed completed	26B	Completed and Bidder's authorized signature
7	Bid signature(s) including EEO certification and DBE assurance	19B	Bidder's authorized signature
8	Bidder's data including joint venture authorization	20B AND 21B	Furnish data
9	Required proposal guarantee (bid deposit furnished)	19B	Attach amount as indicated
10	Affidavit of non-collusion Completed	22B	Bidder's authorized signature (notarized)
11	Forms for participation by DBE Completed	34B through 37B	Furnish information and authorized signatures
12	DBE's Affidavit and most recent certification	36B	Completed Affidavit and attach DBE certification
13	Buy America Certificate Completed	23B	Data and Bidder's authorized signature
14	Certification relating to Debarment, Suspension, ineligibility, and Voluntary exclusion	27B through 30B	Bidder's authorized signature
15	Certification of restrictions on lobbying	31B	Bidder's authorized signature
16	Certification of Year 2000 Compliance	32B	Bidder's authorized signature
17	Certification of construction Equipment Standard Compliance	33B	Bidder's authorized signature

NOTE: Disadvantaged Business Enterprise (DBE) stated goal is 17%.

Minority Manpower Utilization (MMU) percent is 10%.

NA = Not Applicable

Female Construction Workforce: 6.9% per trade

CONTRACT AND BOND FORMS

CONTRACT

Individual Form	2C - 3C
Corporation Form	4C - 5C
PERFORMANCE BOND	6C -7C
LABOR AND MATERIALS PAYMENT BOND	8C

NOTE: **Bond Forms are not to be filled out when submitting Bid Form.**

(Individual Form)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CONTRACT

Clause 1. - This agreement, made this _____ day of _____, in the year two thousand _____ between the Massachusetts Bay Transportation Authority, and _____, herein called the Contractor.

Clause 2. - Witnesseth, that the parties to this agreement, each in consideration of the agreements on the part of the other herein contained, do hereby agree, the Massachusetts Bay Transportation Authority for itself, and said Contractor for himself/themselves and his/their heirs, executors, administrators and assigns, as follows:

The Contractor agrees to furnish all equipment, machinery, tools and labor, to furnish and deliver all materials required to be furnished and delivered in and about the improvement and to do and perform all work under

in strict conformity with the provisions herein contained and of the Notice to Bidders, Bid Form, Supplementary Conditions, Addenda, and Specifications hereto attached and with plans referred to therein. All Specifications, Supplementary Conditions, Plans, Notice to Bidders, Addenda, and Bid Form are hereby specifically made a part of this contract as fully and to the same effect as if the same had been set forth at length herein.

Clause 3. - In consideration of the foregoing premises the Massachusetts Bay Transportation Authority agrees to pay as full compensation for everything furnished and done by the Contractor under this Contract, including all work required but not shown on the plans for the items herein mentioned, and also for all loss of damage arising out of the nature of the work aforesaid, or from the action of the elements (except as excluded in the Standard Specifications, Section 00700, Article 5.19, or the Supplementary Conditions thereto) or from any delay or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of every description in connection with the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work as herein specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set out in the accompanying Bid Form and for all work required, for which there is no item in the Bid Form, such compensation as is provided for in the aforesaid Specifications.

In witness whereof, the said Contractor has/have hereto set his/their hands and seals, and the said Massachusetts Bay Transportation Authority has executed these present by its authorized representatives on the year and day above written.

By

_____ Contractor

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BY:

_____

Daniel A. Grabauskas
General Manager

APPROVED AS TO FORM:

_____

William A. Mitchell, Jr.
General Counsel

S10CN04
2004

J. F. WHITE CONTRACTING COMPANY

At a meeting of the Board of Directors of the J.F. White Contracting Company held on September 7, 2004 at 10 Burr Street, Framingham, Massachusetts, at which all the Directors were present or waived notice,

It was VOTED that Kevin K. Egan, Executive Vice President/Chief Engineer of this corporation, be and is hereby authorized to execute contracts, releases and bonds in the name and behalf of said company, and affix its corporate seal thereto; and such execution of any contract or obligation in this company's name on its behalf by such Kevin K. Egan under the seal of the company, shall be valid and binding upon this company.

A True Copy,

Attest: _____
Robert E. Hoffman, Clerk

Framingham, Massachusetts
September 8, 2004

I hereby certify that I am the Clerk of the J.F. White Contracting Company, that Kevin K. Egan is the duly elected Executive Vice President/Chief Engineer of said company, and that the above vote has not been amended or rescinded and remains in full force and effect as of this date.

_____
Robert E. Hoffman, Clerk

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CONTRACT

Clause 1. - This agreement, made this TWENTY-SECOND day of SEPTEMBER, in the year two thousand and FIVE, between the Massachusetts Bay Transportation Authority, and J. F White Contracting Co., 10 Burr Street, Framingham, MA 01701, herein called the Contractor.

Clause 2. - Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the other herein contained, do hereby agree, the Massachusetts Bay Transportation Authority for itself, and said Contractor for itself and its successors and assigns, as follows:

The Contractor agrees to furnish all equipment, machinery, tools and labor, to furnish and deliver all materials required to be furnished and delivered in and about the improvement and to do and perform all work under MBTA Contract No. S10CN04, Blue Line Modernization Project, Maverick Square Station and Blue Line Vents, East Boston, Massachusetts, for a sum not to exceed Thirty Million, Eight Hundred Thousand, Eight Hundred Eighty-Five and 90/100 Dollars ($30,800,885.90), including Alternate No. 2, based upon a schedule of unit, lump sum and allowance bid prices, in strict conformity with the provisions herein contained and of the Notice to Bidders, Bid Form, Supplementary Conditions, Addenda, and Specifications hereto attached, and with the plans referred to therein. All plans, Specifications, Supplementary Conditions, Notice to Bidders, Addenda, and Bid Form are hereby specifically made a part of this contract as fully and to the same effect as if the same had been set forth at length herein.

Clause 3. - In consideration of the foregoing premises the Massachusetts Bay Transportation Authority agrees to pay and the Contractor agrees to receive as full compensation for everything furnished and done by the Contractor under this contract, including all work required but not shown on the plans for the items herein mentioned, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements (except as excluded in the Standard Specifications, Section 00700, Article 5.19 or the Supplementary Conditions thereto) or from any delay or from an unforeseen obstruction or any difficulty encountered in the prosecution of the work, and for all risks of every description connected with the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work as herein specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set out in the accompanying Bid Form, and for all work required, for which there is no item in the Bid Form, such compensation as is provided for in the aforesaid Specifications.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Board of Directors
Transportation Building
Ten Park Plaza
Boston, Massachusetts 02116

I, Yolanda L. Glasper, Recording Secretary of the Board of Directors of the Massachusetts Bay Transportation Authority, hereby certify that, at a Meeting of the Board of Directors of the Massachusetts Bay Transportation Authority, acting under the provisions of Chapter 161A of the General Laws, as amended to date, duly called and held on the fifth day of May, at which all members were present, the following Vote was adopted:

> **VOTED**: That the General Manager be, and he hereby is, authorized to execute in the name and on behalf of the Authority, subject to the approval of the Executive Office of Transportation and in a form approved by the General Counsel, MBTA Contract No. S10CN04, Blue Line Modernization Project, Maverick Square Station and Blue Line Vents, with J.F. White Contracting Company, for a sum not to exceed $30,800,885.90, including Alternate No. 2, based upon a schedule of unit, lump sum and allowance bid prices, said contractor being the lowest responsible and eligible bidder in response to requests for sealed proposals.

A true copy.

Attest: May 6, 2005

Yolanda L. Glasper
Recording Secretary
Board of Directors of the
Massachusetts Bay Transportation
Authority

In witness whereof, the said Contractor has caused these presents to be signed in its name and behalf and its corporate seal to be hereto affixed by

Kevin K. Egan its Exec. Vice President

and _____ its _____

thereto duly authorized, and the said Massachusetts Bay Transportation Authority has executed these presents by its authorized representatives on the year and day above written.

By _____

J.F White Contracting Co. Contractor
10 Burr Street
Framingham, MA 01701

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BY

ORIGINAL SIGNED BY

Daniel A. Grabauskas
General Manager

APPROVED AS TO FORM:

ORIGINAL SIGNED BY

William A. Mitchell, Jr.
General Counsel

S10CN04
2004

In witness whereof, the said Contractor has caused these presents to be signed in its name and behalf and its corporate seal to be hereto affixed by

Kevin K. Egan its Exec. Vice President

and _____ its _____

thereto duly authorized, and the said Massachusetts Bay Transportation Authority has executed these presents by its authorized representatives on the year and day above written.

By _____

J.F White Contracting Co. Contractor
10 Burr Street
Framingham, MA 01701

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BY

_____

Daniel A. Grabauskas
General Manager

APPROVED AS TO FORM:

_____

William A. Mitchell, Jr.
General Counsel

GKK

S10CN04
2004

104520181
SB0094082

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that J.F. White Contracting Co., 10 Burr Street, Framingham, MA 01701
(Insert full name and address and legal title of Contractor)
as Principal, hereinafter called Contractor, and Travelers Casualty and Surety Company of America and XL Specialty Insurance Company (Here insert full name and address or legal title of Surety) 300 Crown Colony Quincy MA 02169 25 Independence Blvd Warren NJ 07059 as Surety, hereinafter called Surety, are held and firmly bound unto Massachusetts Bay Transportation Authority as Obligee, hereinafter called Authority, in the amount of Thirty Million, Eight Hundred Thousand, Eight Hundred Eighty-Five and 90/100 Dollars ($30,800,885.90), including Alternate No. 2, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,
Contractor has by written agreement dated SEPTEMBER 22ND, 2005, entered into a contract with the Authority for MBTA Contract No. **S10CN04** which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Authority.

Whenever Contractor shall be, and is declared by the Authority to be in default under the Contract, the Authority having performed Authority's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

1) Complete the Contract in accordance with it terms and conditions, or

2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, or, if the Authority elects, upon determination by the Authority and the Surety jointly of the lowest responsible bidder, arrange for a contract between such bidder and the Authority, and make available as Work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by the Authority to Contractor under the Contract and any amendments thereto, less the amount properly paid by the Authority to Contractor.

SURETY DISCLOSURE NOTICE CONCERNING FEDERAL TERRORISM RISK INSURANCE ACT
You should know that, effective November 26, 2002, the US Congress enacted the Terrorism Risk Insurance Act of 2002 (the "Act"). Under the Act, any covered losses caused by certified acts of terrorism would be partially reimbursed by the United States under a formula established by federal law. Under this formula, the United States pays 90% of covered terrorism losses exceeding the statutorily established deductible paid by the insurance company providing the coverage.
In accordance with this Act, we are providing this disclosure notice for bonds on which XL Specialty Insurance Company is the surety.
DISCLOSURE OF PREMIUM
The portion of the bond premium attributable to coverage for certified acts of terrorism under the Act is Zero Dollars ($0.00).

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Authority or the heirs, executors, administrators or successors of the Authority.

Signed and sealed this 22ND day of SEPTEMBER 2005.

WITNESS: PRINCIPAL: Kevin K. Egan

Lucia Throne _____ (Seal)

Exec. Vice President
(Title)

WITNESS: SURETY: Travelers Casualty and Surety Company of America

Deana Santacroce XL Specialty Insurance Company (Seal)

* _____

Jean Brooker (Title) Attorney in-Fact

***Attach hereto proof of authority of officers or agents to sign bond.**

S10CN04
2004

10452018I
SB0094802

LABOR AND MATERIALS PAYMENT BOND

Know all men by these presents, that J. F. White Contracting Co., 10 Burr Street, Framingham, MA 01701, as principal and Travelers Casualty and Surety Company of America and XL Specialty Insurance Company as surety, are held and firmly bond unto the Massachusetts Bay Transportation Authority (MBTA) in the sum of $ Thirty Million, Eight Hundred Thousand, Eight Hundred Eighty-Five 90/100 Dollars ($30,800,885.90), including Alternate No. 2, lawful money of the United States of America, to be paid to the MBTA, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the said principal has made a contract with the MBTA for the construction of MBTA Contract No. MBTA Contract No. S10CN04, Blue Line Modernization Project, Maverick Square Station and Blue Line Vents, East Boston, Massachusetts.

Now the condition of this obligation is such that if the principal and its subcontracts shall pay for all labor performed or furnished and for all materials and equipment used or employed in said contract and in: any and all duly authorized modifications, alterations, extensions, changes or additions thereto, all as set forth in Massachusetts General Laws, Chapter 149 Section 29 and Chapter 30 Section 39A, then this obligation shall become null and void; otherwise it shall remain in full force and virtue, the rights and obligations of the principal, the surety and claimants being as set forth in said M.G.L. c. 149 § 29.

The surety hereby stipulates and agrees that no change or modification in, or extension of time, or alterations or additions to the contract or in the work shall in any way affect its obligations on this Bond and does hereby waive notice of any such change, modification, extension, alteration or addition.

In witness whereof we hereunto set our hands and seals this 22ND day of SEPTEMBER 2005.

Kevin K. Egan

J.F White Contracting, Co.
(Print ~~Name of General Contractor~~ Principal)

By _____ Exec. Vice President
(Signature - Title)

Travelers Casualty and Surety Company of America
XL Specialty Insurance Company (Seal)
(Print Name of Surety)

By _____
(Signature - Title) Jean Brooker Attorney-in-fact

Business Address 99 High St Boston MA 02110

Countersigned MA Resident Agent by _____

Address 99 High St Boston MA 02110

Telephone No. 617 482 3100

Attach herewith proof of authority of officers or agents to sign the bond.

SURETY DISCLOSURE NOTICE CONCERNING FEDERAL TERRORISM RISK INSURANCE ACT

You should know that, effective November 26, 2002, the US Congress enacted the Terrorism Risk Insurance Act of 2002 (the "Act"). Under the Act, any covered losses caused by certified acts of terrorism would be partially reimbursed by the United States under a formula established by federal law. Under this formula, the United States pays 90% of covered terrorism losses exceeding the statutorily established deductible paid by the insurance company providing the coverage.

In accordance with this Act, we are providing this disclosure notice for bonds on which XL Specialty Insurance Company is the surety.

DISCLOSURE OF PREMIUM

The portion of the bond premium attributable to coverage for certified acts of terrorism under the Act is Zero Dollars ($0.00).

TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA
TRAVELERS CASUALTY AND SURETY COMPANY
FARMINGTON CASUALTY COMPANY
Hartford, Connecticut 06183-9062

POWER OF ATTORNEY AND CERTIFICATE OF AUTHORITY OF ATTORNEY(S)-IN-FACT

KNOW ALL PERSONS BY THESE PRESENTS, THAT TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA, TRAVELERS CASUALTY AND SURETY COMPANY and FARMINGTON CASUALTY COMPANY, corporations duly organized under the laws of the State of Connecticut, and having their principal offices in the City of Hartford, County of Hartford, State of Connecticut, (hereinafter the "Companies") hath made, constituted and appointed, and do by these presents make, constitute and appoint: **Kevin A. White, Michael J. Cusack, Mark P. Herendeen, Jean Brooker, Jean M. Feeney, Susan M. Kedian, Natalie Coneys, Diana Santackas, John J. Gambino**, of **Boston, Massachusetts**, their true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred to sign, execute and acknowledge, at any place within the United States, the following instrument(s): by his/her sole signature and act, any and all bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking and any and all consents incident thereto and to bind the Companies, thereby as fully and to the same extent as if the same were signed by the duly authorized officers of the Companies, and all the acts of said Attorney(s)-in-Fact, pursuant to the authority herein given, are hereby ratified and confirmed.

This appointment is made under and by authority of the following Standing Resolutions of said Companies, which Resolutions are now in full force and effect:

VOTED: That the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her.

VOTED: That the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary.

VOTED: That any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary, or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority.

This Power of Attorney and Certificate of Authority is signed and sealed by facsimile (mechanical or printed) under and by authority of the following Standing Resolution voted by the Boards of Directors of TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA, TRAVELERS CASUALTY AND SURETY COMPANY and FARMINGTON CASUALTY COMPANY, which Resolution is now in full force and effect:

VOTED: That the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

ST PAUL TRAVELERS

IMPORTANT DISCLOSURE NOTICE OF TERRORISM INSURANCE COVERAGE

On November 26, 2002, President Bush signed into law the Terrorism Risk Insurance Act of 2002 (the "Act"). The Act establishes a short-term program under which the Federal Government will share in the payment of covered losses caused by certain acts of international terrorism. We are providing you with this notice to inform you of the key features of the Act, and to let you know what effect, if any, the Act will have on your premium.

Under the Act, insurers are required to provide coverage for certain losses caused by international acts of terrorism as defined in the Act. The Act further provides that the Federal Government will pay a share of such losses. Specifically, the Federal Government will pay 90% of the amount of covered losses caused by certain acts of terrorism which is in excess of an insurer's statutorily established deductible for that year. The Act also caps the amount of terrorism-related losses for which the Federal Government or an insurer can be responsible at $100,000,000,000.00, provided that the insurer has met its deductible.

Please note that passage of the Act does not result in any change in coverage under the attached policy or bond (or the policy or bond being quoted). Please also note that no separate additional premium charge has been made for the terrorism coverage required by the Act. The premium charge that is allocable to such coverage is inseparable from and imbedded in your overall premium, and is no more than one percent of your premium.

THIS IS NOT A BOND NUMBER

XL SPECIALTY
AN XL CAPITAL COMPANY

UNLIMITED POWER OF ATTORNEY

XLS 115892

KNOW ALL MEN BY THESE PRESENTS: That the XL SPECIALTY INSURANCE COMPANY, a corporation organized and existing by virtue of the laws of the State of Delaware ("Company" or "Corporation"), with offices at 25 Independence Blvd., Suite 402, Warren, New Jersey, 07059, does hereby nominate, appoint, ***Jean M. Feeney, Michael J. Cusack, Kevin A. White, Mark P. Herendeen, Jean Brooker, Susan M. Kedian, Natalie Coneys, John J. Gambino, Diana Santackas***

its true and lawful Attorney(s)-in-fact to make, execute, attest, seal and deliver for and on its behalf, as surety, and as its act and deed, where required, any and all bonds, undertakings, recognizances and written obligations in the nature thereof, the penal sum of no one of which is in any event to exceed $UNLIMITED.00. Such bonds and undertakings, when duly executed by the aforesaid Attorney(s)-in-fact shall be binding upon the said Company as fully and to the same extent as if such bonds and undertakings were signed by the President and Secretary of the Company and sealed with it's corporate seal. This Power of Attorney is granted and is signed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company on the 5th day of December, 1988:

"RESOLVED, That the President, or any Vice President of the Company or any person designated by any one of them is hereby authorized to execute Powers of Attorney qualifying the attorney named in the given Power of Attorney to execute in behalf of the Company, bonds, undertakings and all contracts of suretyship, and that any Secretary or any Assistant Secretary of the Company be, and that each or any of them hereby is authorized to attest the execution of any such Power of Attorney, and to attach thereto the Seal of the Company.
FURTHER RESOLVED, That the signature of such officers and the Seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be thereafter valid and binding upon the Company with respect to any bond, undertaking or contract of suretyship to which it is attached."

Bonds executed under this Power of Attorney may be executed under facsimile signature and seal pursuant to the following Resolution adopted by the Board of Directors of the Company on August 7, 1997.

RESOLVED, That the signature of John P. Hyland, as Vice President of this Corporation, and the seal of this Corporation may be affixed or printed on any and all bonds, undertakings, recognizances, or other written obligations thereof, on any revocation of any Power of Attorney, or on any certificate relating thereto, by facsimile, and any Power of Attorney, any revocation of any Power of Attorney, bonds, undertakings, recognizances, certificate or other written obligation, bearing such facsimile signature or facsimile seal shall be valid and binding upon the Corporation.

IN WITNESS WHEREOF, the XL SPECIALTY INSURANCE COMPANY has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officers this December 28th, 2004.

XL SPECIALTY INSURANCE COMPANY

SPECIALTY INSURANCE CORPORATE SEAL XL DELAWARE

BY VICE PRESIDENT

STATE OF DELAWARE
COUNTY OF NEW CASTLE

Attest:

SECRETARY

On this 28th day of December, 2004, before me personally came John P. Hyland to me known, who, being duly sworn, did depose and say: that he is Vice President of the Corporation described in and which executed the above instrument; that he knows the seal of said Corporation; that the seal affixed to the aforesaid instrument is such corporate seal and was affixed thereto by order and authority of the Board of Directors of said Company; and that he executed the said instrument by like order.

REBECCA CLAIRE SHALHOUB NOTARY PUBLIC STATE OF NEW JERSEY

REBECCA CLAIRE SHALHOUB
Notary Public
State of New Jersey
My Commission Expires 3/8/2007

NOTARY PUBLIC

STATE OF NEW JERSEY
COUNTY OF BERGEN

I, Ben M. Llaneta, Secretary of the XL SPECIALTY INSURANCE COMPANY a corporation of the State of Delaware, do hereby certify that the above and forgoing is a full, true and correct copy of Power of Attorney issued by said Company, and that I have compared same with the original and that it is a correct transcript therefrom and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company, at the City of Wilmington, this 22ND day of SEPTEMBER 2005.

SECRETARY

SPECIALTY INSURANCE CORPORATE SEAL XL DELAWARE

This Power of Attorney may not be used to execute any bond with an inception date after December 28, 2008

This document is printed on a blue background

INSURANCE CERTIFICATES

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY) 06/27/05

PRODUCER
Aon Risk Services, Inc. of Massachusetts
99 High Street
Boston MA 02110 USA

PHONE (866) 266-7475 FAX (866) 467-7847

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
J.F. White Contracting Co. Inc
P.O. Box 9020
Framingham MA 01701 USA

INSURERS AFFORDING COVERAGE

INSURER A:	Liberty Insurance Underwriters, Inc.
INSURER B:	Zurich American Ins Co
INSURER C:	National Union Fire Ins Co of Pittsburgh
INSURER D:	
INSURER E:	

COVERAGES This Certificate is not intended to specify all endorsements, coverages, terms, conditions and exclusions of the policies shown. SIR May Apply

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE(MM\DD\YY)	POLICY EXPIRATION DATE(MM\DD\YY)	LIMITS	
B	GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [X] LOC	GL0297868405 Commercial General Liability	12/31/04	12/31/05	EACH OCCURRENCE FIRE DAMAGE(Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$2,000,000 $500,000 $10,000 $2,000,000 $4,000,000 $4,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [X] HIRED AUTOS [X] NON OWNED AUTOS	MA297868505 Business Automobile Coverage	12/31/04	12/31/05	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000
	GARAGE LIABILITY [ ] ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG	
C	EXCESS LIABILITY [X] OCCUR [ ] CLAIMS MADE [ ] DEDUCTIBLE [X] RETENTION $10,000	BE5684511 Commercial Umbrella	12/31/04	12/31/05	EACH OCCURRENCE AGGREGATE	$10,000,000 $10,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	WC297868305 Workers Compensation	12/31/04	12/31/05	[X] WC STATUTORY LIMITS [ ] OTHER E.L. EACH ACCIDENT E.L. DISEASE-POLICY LIMIT E.L. DISEASE-EA EMPLOYEE	$1,000,000 $1,000,000 $1,000,000
A	OTHER [X] Pollutn/Env Imp	UBENY100372014 POLLUTION LIABILIT	07/13/04	07/13/05	Aggregate Limit Per Occurrence Limit	$1,000,000 $5,000,000

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS
Project: MBTA #S10CN04 Maverick Square Station - Blue Line Modernization / JFW #0505. The MBTA, MPA, Noddle Island Limited Partnership and Boston Housing Authority are included as an Additional Insured on the General Liability, Automobile, Umbrella and Pollution Liability policies as it relates to work performed by the Named

CERTIFICATE HOLDER

Massachusetts Bay
Transportation Authority
10 Park Plaza
Boston MA 02116 USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

AON RISK SERVICES OF MASSACHUSETTS

By

ACORD 25-S (7/97) ©ACORD CORPORATION 1988

Holder Identifier :

Certificate No : 570014026426

OK - P. Hoffman — 6/28/05

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BOARD OF DIRECTORS

Daniel A. Grabauskas, Chairman

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GENERAL MANAGER

Michael H. Mulhern

ASSISTANT GENERAL MANAGER FOR DESIGN AND CONSTRUCTION

David W. Ryan

property without the presence of an assigned MBTA representative from the Design and Construction Department or the Operations Department who is responsible for monitoring the work of that owner or contractor for the Authority. Working on Authority property without an assigned MBTA representative present shall be cause for immediate eviction from the property.

4. The contractor must have in place a method of payment for all Authority support services such as flagging, training, work trains, power shut offs, etc., prior to commencement of any work. This will be processed through a written force account agreement between the Authority and the owner or contractor prior to commencement of work. Direct billing to contractors for Authority support services requires the contractor's authorized representative to agree in writing that the company will reimburse the Authority for those support services, including overhead and fringe benefits. Once the Authority receives the signed statement from the contractor, the General Accounting Office will open a reimbursable account for specific Authority department(s) to charge costs, and the contractor will be billed directly.

5. The work associated with this project, except as hereinafter expressly provided, will be done without interruption of or change in the regular work or operation of vehicles of the Authority. No work shall be done affecting the operations of vehicles or operations of stations until the contractor has submitted details of his procedures to the Design and Construction and the applicable Operations representatives thirty (30) working days prior to start of work and has secured written permission to proceed.

6. The Authority reserves the right to require work affecting the safety of the operations to be performed at prescheduled non-operating periods from 1:30 a.m. to 5:00 a.m. daily; 1:30 a.m. to 6:00 a.m. Sunday. The contractor will not be permitted to remain within the track right-of-way after 5:00 a.m. (6:00 a.m. Sunday). The Authority may, during emergencies or at times when the Authority work forces are required to work in the area of the contractors work, order the contractor to cease work and remove his work forces and equipment from the property leaving the right-of-way in a safe operating condition. The Authority also reserves the right to stop or postpone any contractor's previously approved work if, in the Authority's opinion, such work is being performed in a manner that will endanger and/or delay the Authority's regular work or operations or compromise the health and safety of personnel working on the project.

7. The Contractor shall make their own provisions for electric power, compressed air, water, ventilation, and disposal of seepage water. No use of existing MBTA utilities will be permitted unless approved in advance by the Authority.

8. The Contractor's attention is directed to other projects that will be ongoing simultaneously in the work area. The Authority will determine priorities for site access between this project and others.

9. The Authority reserves the right to deny the contractor access to the right of way because of operational requirements, adverse weather conditions or emergency track, signal, and power repairs. The contractor shall reasonably expect to be denied access to the site a total of 10 (ten) days per calendar year, this does not include the following holidays; New Year's Day, President's Day, Patriot's Day, Memorial Day, Bunker Hill Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, and Christmas Day. In addition, right of way access may be denied on days when various Special Events impact service as well as during Red Sox home games on the Green Line. Furthermore, the contractor shall also expect to have his access to the site delayed a total of 4 (four) times per month. Each delay shall be 60 (sixty) minutes or less. The contractor shall make allowances for these possible events in their bid. Due to increased stopping distances associated with slippery rail conditions, non-emergency access will not be allowed within ten (10) feet of the centerline of the track under adverse weather conditions.

10. The contractor shall perform his work at all times so as to cause no interruption of service during operating hours and shall at all times after performing work during either operating hours or non- operating hours leave the Authority's property in a clean and safe operating condition.

11. On occasion, the Authority will operate work cars, test trains, security trains, and/or hi-rail vehicles in the area of the work. At no time during these occurrences will the contractor be allowed to work on the right-of-way, except with the approval of the Authority or the Authority personnel providing protection services as defined in Protection Services.

C. INSURANCE REQUIREMENTS

1. The Contractor's for MBTA Construction Contracts insurance requirements shall conform to the latest version of MBTA Standard Specifications, Division 1 – General Requirements, Section 00700 - General Conditions, Article 5 - Legal Relations and Responsibility to the Public, Paragraph 5.04 - Insurance Requirements. Owners or Contractors under a lease or license agreement with the MBTA shall provide insurance in accordance with the requirements of said agreement.

D. OPERATIONAL RESTRICTIONS

1. The Contractor is made aware that the work will be performed adjacent to or over operating tracks, signal lines, communication lines, power lines, cables and other facilities belonging to the Authority. The owner or contractor is to take all due precautions to protect the Authority's facilities, utilities, and operations during the course of his work. When in the opinion of the Authority's Chief Engineer of Design and Construction, Director of Safety, Director of Subway Operations, Director of Systemwide Maintenance & Improvements, Director of Operations Support, or their representatives, the contractor's work would cause hazard to the Authority's facilities, infrastructure, or to the safe operation of the transit system, the Authority will assign qualified personnel deemed necessary to protect the property, facilities and operations, all at the expense of the contractor.

2. The contractor is specifically prohibited from conducting any operations next to or over the right-of-way that have the potential to adversely impact the operations of Authority revenue service during normal operating hours (approximately 5:00 a.m. to 1:30 a.m.). Certain work adjacent to the right-of-way, described below as hazardous work, may take place during restricted revenue hours at the discretion of the Chief of Orange, Red, Green, or Blue Line Operations as applicable and require flagmen present.

3. Access to the MBTA right-of-way, which encompasses all MBTA property (fence to fence, wall to wall, and property line to property line over which Authority vehicles operate, including sidings and yards), is contingent upon Owner or Contractor compliance with the "MBTA Right-of-Way Safety Rulebook" that outlines Right-of-Way Safe Practices for Access on or Near the Right-Of-Way.

   As specified in the Right of Way Safety Rulebook, all persons who access the MBTA right of way must attend a one-day, eight-hour training class conducted by Subway Operations Training and the Safety Department. Attendees must successfully complete the Right of Way Safety Training in order to receive a Right of Way license. The license is valid for a two-year period after which the person must attend the Authority's Right of Way re-certification class. To register for the "Right of Way Safety" class, contact:

   Supervisor and Chief Rules Examiner of Training
   Cabot RTL Training
   275 Dorchester Avenue, 2nd floor
   South Boston, MA 02127
   Telephone: (617) 222-5377

In addition to this training, all contractors and subcontractors will attend a four-hour Contractor Safety Awareness Class provided by the Safety Department at a location to be determined by the Authority. Recipients of the Contractor Safety Awareness Class will receive a certificate of completion along with a sticker for their hardhat and will be valid for three years from the time of receipt. The cost of this class will be $50. To register for this class, contact:

Assistant Director of Safety
21 Arlington Avenue, Building 2
Charlestown, MA 02129
Telephone: 617-222-1978

4. The Authority will consider the property; facilities and operations fouled or subject to hazard when the following occurs:

   a. When any object or operation is or can be brought nearer than ten (10) feet to the centerline of an operating track.
   b. When an object or excavation is brought nearer than four (4) feet to a signal or communication line.
   c. When an object or excavation is brought nearer than ten (10) feet to a power line or cable.
   d. When explosives are used in the vicinity of the premises. Explosives shall not be used on or adjacent to the Authority's property or facilities without written consent of the Authority's Chief Engineer of Design and Construction and then shall be used only by a licensed blaster, licensed in the Commonwealth of Massachusetts, at times and under conditions acceptable to the Authority.
   e. When cranes, trucks, power shovels, pile driver or any other equipment are working in positions that failure with or without load could occur nearer than 10 feet to the centerline of an operating track.

   It shall be the responsibility of the contractor to inform the Director of Safety, Chief of Orange, Red, Green, or Blue Line Operations as applicable in writing thirty (30) working days prior to all times when they intend to perform hazardous work as described above. Submittal must include a site plan, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and number of days, including time schedule, the contractor intends to remain on the property at each location. Failure of the contractor to provide the appropriate Line Chief with the specified advanced notice of hazardous work will result in the stoppage of work by the Authority.

5. The Contractor will be allowed on the right-of-way only after normal revenue service (1:30 a.m. to 5:00 a.m. daily, 6:00 a.m. Sundays). On occasion, the Authority will operate work cars in the area of the project work during non-revenue hours. At no time during these occurrences will the contractor be allowed to work on the right-of-way except with the approval of the Authority. The contractor shall coordinate their schedule at least twenty-four (24) hours in advance with the Authority.

6. No weekday/weekend transit service interruptions will be allowed on this project except as specified herein, and within Section 01010, SUMMARY OF THE WORK. There will be five (5) weekend shut downs allowed of the Blue Line across Maverick Station when the station will be closed for Contractors full access to the work.

   No work impacting Authority operations will be allowed on the following dates, holidays or special events:

   New Year's Day
   Patriots Day
   Memorial Day

July 4th
Labor Day
Thanksgiving Day
Christmas Day
December 31

a. A weekend Shutdown is defined as 1:00 o'clock AM on Saturday morning, until 5:00 o'clock AM Monday morning.

b. The contractor must schedule all work requiring a shutdown of revenue service and/or station and/or platform operations during these allowed shut down periods, or during other non-revenue hours.

c. The Contractor may purchase additional weekend shutdowns from the MBTA at the rate of $75,000 to cover the cost of busing passengers. Request must be made in writing to the Director of Blue Line Operations."

7. Prior to the contractor leaving any work site, at the completion of each workday, the contractor shall ensure that the site is in proper condition to permit normal transit operations to resume. If, in the opinion of the Authority, the site is not suitable for normal transit operations due to conditions caused by the contractor, the Authority will allocate a suitable number of personnel to rectify the site. The owner or his contractor shall be charged full costs of such personnel and necessary equipment, including the full cost of replacement services during the cleanup period.

8. In the event that the contractor does not adhere to the work period limitations of the special conditions and causes delay in returning the right-of-way to revenue service at the end of any work period, the owner or his contractor shall pay the Authority for substitute bus service a sum not to exceed $250.00 per hour per bus for the entire duration of the delay and including mobilization and demobilization of the bus service. The minimum charge shall be (3) hours per bus per delay. The owner or the contractor will reimburse the Authority for the hourly costs of personnel used during such delays (e.g., supervisors, officials, gatepersons, flagpersons, and automotive). The required number of buses to adequately accommodate all Authority customers who are inconvenienced by the delay shall be at the sole discretion of the Authority's Bus Operations Department. Whatever sum of money may become due and payable to the Authority by the owner or his contractor under this article may be retained out of money belonging to the contractor in the hand and possession of the Authority. This article shall be construed and treated by the parties to the contract not as imposing a penalty upon the contractor for failing fully to complete the work within the periods as specified herein, but as liquidation damages to compensate the Authority for additional costs incurred by the Authority because of the failure of the contractor to fully complete said work within the work periods specified.

9. The contractor shall assume full responsibility for the safety of all their work. They shall perform the work in a manner that will ensure the safety of both personnel and property. The contractor shall prevent against safety hazards, and the exposure of persons and equipment to hazardous and/or potentially hazardous conditions. All work in the construction of the project shall comply with the requirements of the Authority, Department of Labor, Occupational Safety and Health Administration (OSHA) provisions, as well as those of state and local regulations. Safe breathing levels must conform to the Massachusetts Department of Environmental Protection (DEP) standards. In the case of conflict of regulations, the most stringent will apply. If the standards are not met, the Authority has the right to stop the work until such time as the contractor is in compliance with standards.

10. Any deviation or disruption to existing pedestrian pathways shall be submitted to the Engineer and to BTD for approval.

E. PROTECTION SERVICES

1. When the contractor is performing work in the vicinity of Authority rights-of-way or public areas, the Authority will require the contractor to have at the site such authorized and qualified personnel as may be required to adequately protect the Authority's customers, employees, property, facilities and operations from hazardous conditions.

2. The need for protection services is outlined and described in the Authority's Right-of-Way Safety Rulebook. The appropriate Line Chief, or their representative, shall determine what protection services are required and assign flagging personnel, officials, supervisors, coordinators or any other such personnel as may be required to ensure the safety of the Authority's operations. Personnel shall be provided from the Authority's workforce in such numbers as the Line Chief determines. Costs for all protection services and supplies shall be the responsibility of the owner or contractor. No work will be allowed if flagmen are required, but not on duty. During the prosecution of the work, if the Contractor requires and orders flagging, it is provided by the Authority, and the Contractor elects not to use it, the Authority will back charge the Contractor. The rate will be calculated at a Level II 6-person crew for an eight hour shift, currently estimated at $2,300. The charge to the Contractor will be adjusted to the actual circumstances of the incident.

3. When it is determined that protection services are required, the contractor must notify the Authority twenty-four (24) hours in advance and before 10.00 a.m. on the workday preceding the day that protection services will be required. Requests for protection services for weekends and/or holidays, must be made on the preceding Friday before 10.00 a.m., or before 10.00 a.m. on the workday preceding the holiday.

   Requests for protection services for Non-Operating hours 1.30 a.m.–5.00 a.m. and in order for the work to be included on the Night Orders you must contact the:

   Planning and Scheduling Coordinator
   Maintenance of Way
   617-222-5419

   Requests for protection services for Operating hours 5.00 a.m.-1.30 a.m. and in order for the work to be included on the Day Orders, you must contact:

   Blue Line Superintendent:
   617-222-5532

4. It will be at the sole discretion of the Authority whether the Contractor will be allowed to perform work on any particular day or night.

5. The contractor will be required to provide each flagperson on duty with properly functioning safety equipment as approved by the Authority's Safety Department. This equipment includes but is not limited to: orange safety cones, red, yellow, and green flags, airhorns, hardhats, safety goggles, and hearing protection. The contractor will not be allowed on or adjacent to the right-of-way if flagging personnel are not equipped with required safety personal protective equipment.

6. The contractor will supply properly functioning Authority-frequency portable radios to each flagperson on duty on a daily basis. The contractor will be responsible for storing and maintaining radios throughout the life of the contract.

7. All workers employed by the contractor who are to work within the Authority's stations, track area, right-of-way or adjacent to the traction power system or any high voltage electrical cables, shall be required to attend a safety awareness course at the Authority's Subway Operations Training School. The course is to make the contractor's personnel aware of the particular hazards related to the Authority's operations.

8. All personnel working on the project site in the immediate vicinity of, or within the right-of-way, are required to wear orange reflective safety vests, similar to standard Authority equipment as specified in the Right-of-Way safety Rulebook.

9. Work activities necessitating the traction power system (third rail and catenary) de-energization will require the services of an Authority power lineperson on site at all times and the contractor is responsible for any costs incurred by the Authority as a result of this action.

10. Prior to the implementation of the contracted work, and throughout the life of the contract, the contractor will be required to supply professionally rendered signs, as directed by the Authority's Marketing Department. These signs will include, but are not limited to, the following:

    a. Informational signs for revenue service diversion.
    b. Station directional and stairway, platform, exit closing signs.
    c. General project informational signs for Authority customers.

11. Upon the direction of the Authority's Assistant General Manager of Design and Construction and/ or Director of Subway Operations or their representatives, the Contractor will be required to supply partitions and wooden barricades to cordon off the work site; such partitions and barricades shall be maintained and remain graffiti free by the contractor for the duration of the project.

12. Upon direction from the Authority's Assistant General Manager of Design and Construction and / or Director of Subway Operations or their representatives, the contractor will supply the following when site conditions warrant:

    a. Emergency and temporary lighting.
    b. Exhaust fans of sufficient size and numbers to adequately ventilate the work site, tunnel and /or adjacent stations.
    c. Fire and / or garden hose for the purpose of dust control.

13. It shall be the responsibility of the contractor to keep the Authority informed prior to all times when they intend to perform hazardous work. Failure of the contractor to provide the Authority with suitable advance notice of hazardous work will result in the stoppage of the work by the Authority until such time as sufficient numbers of protection personnel are on duty at the site.

F. ANNUAL CERTIFICATION OF HI-RAIL EQUIPMENT

1. All equipment used by the contractor on Authority property shall be inspected by the Maintenance of Way engineer and/or the MBTA safety Department for clearance and safety standards, and shall not be used if considered unsafe. All contractor/ subcontractor equipment (including hi-rail) operators must be trained, certified, and properly licensed. Documentation of same must be readily available and provided to the Authority upon request. If the contractor equipment is involved in a derailment or near miss incident or an accident, which caused injury or exposed personnel to injury and/ or caused damage to Authority property, that equipment will be subject to the Impound Policy/ Procedure.

2. Contractor equipment to be used on or in the vicinity of the track shall be in first class condition, so as to positively prevent any failure that would cause delay in Authority operations or damage to its property or compromise the health and safety of personnel working on the project. Equipment shall not be placed or operated within the fouling distance of track without first obtaining the permission of the Authority.

3. The contractor shall not, at any time, operate equipment or machinery over Authority's right-of-way without the use of hi-rail gear. All equipment that the contractor proposes to operate shall be modified to operate over the Authority's track and special work (e.g., switches, crossover frogs third rail, and restraining rail). Qualified Authority personnel shall control the movement of all hi-rail equipment at all times while operating on the Authority right-of-way. The contractor shall supply a portable radio

for each hi-rail vehicle entering the Authority's right-of-way. No hi-rail equipment will be allowed on Authority's property without a functioning portable radio tuned to an Authority frequency.

4. The contractor shall furnish hi-rail equipment capable of operating within the strict confines of the right-of-way. No Authority owned equipment is available for the contractor's use. In addition to equipment necessary to complete the work on a regular basis, the contractor shall be required to have on site sufficient standby equipment capable of: a) removing disabled equipment from the right-of way, and b) replacing disabled equipment in order to return the right-of-way to normal operating status by the end of the designated work period. As part of the pre-qualification statement, the contractor shall furnish an itemized list of all equipment to be used on the project, including:

   a. Type of equipment (e.g., pickup, flatbed or dump trucks, excavator, cranes, etc.).
   b. Make, model and date of manufacturer.
   c. Ownership.
   d. Present use and date of availability.
   e. Location where equipment may be inspected by Authority personnel during the pre-qualification period.

5. The contractor shall have proof of competency for hi-rail operators (e.g., documentation that the operator of hi-rail equipment is certified to operate that specific piece of equipment). The Authority reserves the right to review the lesson plan and audit the training class. The hi-rail operator will be responsible for ensuring and documenting that the vehicle is safe for operation and that all required equipment is present and properly secured. This must be done on a daily basis prior to operating the equipment.

6. The contractor is required to have an Annual Certification of hi-rail equipment (separate form the Registry Inspection) signed by a competent person (e.g. Manufacturer's representative) asserting to the fact that the equipment is Original Equipment Manufacturer (OEM), that it conforms to the latest standards, was installed per the manufacturer's specification, and is functioning properly.

7. The contractor must keep a copy of the Manufacturer's Operating Manual or instructions onboard the hi-rail equipment at all times.

8. The operator shall operate the hi-rail equipment at a reasonable speed for the existing conditions, being alert for another vehicle (or any other obstruction along the right of way). In addition, said operator must maintain a safe spacing of traveling equipment.

9. The contractor's hi-rail vehicles must be equipped with a horn (warning device), and an exhaust gas purifier.

10. All equipment when used in tunnels and/ or darkness must conform to the Authority's standards for headlights and marker lights. In addition, when vehicles are operating in tandem such as rail carts, flat cars, etc., such vehicles must be equipped with a flashing/strobe light when the lead vehicle is other than the operating vehicle. Diesel powered equipment only will be allowed in the tunnel and shall be removed from the tunnel each night unless otherwise permitted by the Director of Subway Operations.

11. Contractors must comply with the Authority's Propane Gas policy.

12. Contractor's doing "hot work" must have appropriate permits and follow all applicable rules and procedures for same.

C. Article 6.05 - CHARACTER OF WORKMEN, METHODS AND EQUIPMENT

This Article is Supplemented as follows:

J. Prior to the Contractor's selection of the job superintendent, a detailed resume must be submitted to the Authority for approval. Included in the job superintendent's requirements are:

1. Commonwealth of Massachusetts Department of Public Safety License for Construction Supervisor without any restrictions.

2. A minimum of 10 years if related construction experience.

The above requirements may only be waived by the Director of Construction.

D. 6.08 DETERMINATION AND EXTENSION OF CONTRACT TIME FOR COMPLETION

A.. This Article is Supplemented as follows:

1. Delete paragraph A. and substitute the following:

The Contractor shall complete, entirely, and in an acceptable manner, the Work required under the Contract within the time stated in the Bid Form, except that the Contract time for completion shall be adjusted as follows:

1. If the Contract is not awarded as contemplated by Section 00100 of the Contract Specifications, then the number of days allowed for the completion of the Work will be computed from the date of receipt of the Contract by the Contractor or the date on which the Contractor was ordered to commence work whichever is later. For the purpose of this paragraph, the Contractor will be presumed to have received the Contract on the day following the mailing of the executed Contract to the Contractor by the Authority. If the Contract specifies a specific calendar date for completion and the Contract is not awarded as contemplated by Section 00100, of the Contract Specifications. then the Contractor will be entitled to an extension of time equivalent to the number of days elapsed from 60 days (45 days if Federal funds are involved) after the opening of bids up to and including the day of receipt of the executed Contract by the Contractor or the date on which the Contractor was ordered to commence Work whichever is later.

E. Article 6.11 - TERMINATION FOR CONVENIENCE

Add new Article 6.11 as follows:

A. If the Engineer determines that it is in the public interest to do so, the Engineer may notify the Contractor to discontinue all work, or any part thereof. Such notice shall be given to the Contractor in writing and thereupon the Contractor shall discontinue such work, or such part thereof, as the Engineer may designate.

B. If the Engineer notifies the Contractor to discontinue all work, or any part thereof, the Engineer shall pay and the Contractor shall accept, as full payment for all work done and materials provided, the following sums:

1. For all completed items of work for which there are unit prices provided in the Contract. The original contract unit prices.

2.. For all work on partially completed items.

A sum agreed to by Contractor and Engineer or:

(a) The actual cost for direct labor, materials (less salvage value, if any) and use of equipment plus 10% of this total for overhead; and (b) the actual cost for Worker's Compensation and Employer's Liability Insurance, Health, Welfare and Pension benefits, Social Security deduction, and Employment Security Benefits; and (c) 6 percent of the total of (a) and (b) for profit and; (d) the estimated proportionate cost of surety bonds; and (e) the actual cost to the Contractor for work performed by a Subcontractor plus 10 percent of such

cost. No allowance shall be made for general superintendence and the use of small tools and manual equipment.

3. For costs of settlement as:

   a. Reasonable and necessary accounting, legal, clerical and other costs of work discontinuance; and reasonable and necessary storage, transportation and other costs incurred for the preservation, protection or disposition of the discontinued work.

   b. When requested by the Engineer, the Contractor shall furnish itemized statements of the cost of the work performed and shall give the Engineer access to all accounts, bills and vouchers relating thereto and unless the Contractor, when requested, shall furnish such itemized statements and access to all accounts, bills and vouchers, he shall not be entitled to payment for the work for which such information is sought by the Engineer.

   c. The Contractor shall not be paid and the Contractor shall not have any claims for loss of anticipated profits, for loss of expected reimbursement or for any increased expenses resulting directly or indirectly from the discontinuance of any or all work or from unbalanced allocations, among the contract items, of overhead expense on the part of the bidder and subsequent loss of expected reimbursement therefore or for any other cause.

   d. The Contractor shall incorporate the provisions of this Article and provisions in its Contracts with each of its Subcontractors.

CERTIFICATE OF COMPLIANCE
(Manufacturer of Fabricated Material)

Date_____20____

WE HEREBY CERTIFY THAT

_____
(Description, or Kind of Material)

Furnished to _____
(Name of Contractor Prime or Sub)

For Use on_____ Federal No. _____
(Project No.)

In the Amount of _____
(Quantity Represented)

Identify by_____
(Label, Marking, Seal No., Consignment, or Waybill No.)

Shipped on_____20__ Delivered on_____20_____

Shipped via

_____ (Method of Shipment, Car No., or Truck No.)

MEETS THE REQUIREMENTS OF THE PERTINENT PROJECT PLANS, SUPPLEMENTARY CONDITIONS AND SPECIFICATIONS OF THE MASSACHUSETTS BAY TRANSPORTATION AUTHORITY, IN ALL RESPECTS, PROCESSING, PRODUCT TESTING AND INSPECTION CONTROL OF RAW MATERIALS ARE IN CONFORMANCE WITH ALL APPLICABLE SPECIFICATIONS, DRAWINGS AND/OR STANDARDS OF ALL ARTICLES FURNISHED.

All records and documents pertinent to this certificate and not submitted herewith will be maintained available by the undersigned for a period of not less than three years from date of final payment by the MBTA.

(Manufacturer of Supplier)

Signed by_____

Title_____NOTARY STAMP
Notarized Signature of Person
having Legal Authority to bind the Supplier

INSTRUCTIONS
1. The above is a suitable sample of an acceptable certificate.
2. Certificate is to be submitted in triplicate to the Engineer prior to, or on delivery of, material.
3. The following regulation is applicable to all projects involving Federal Funds.

Section 1001 of Title 18 of the United States Code (Criminal Code and Criminal Procedure) is applicable to this statement. (Section 1001 of Title 18, among other things, provides that whoever knowingly and willfully makes or uses a document or writing containing any false, fictitious or fraudulent statement or entry, in any matter within the jurisdiction of any Department or Agency of the United States shall be fined not more than $10,000 or imprisoned not more than five years, or both).

7. MINIMUM STATE WAGE RATES

A. The minimum wage rates to be used for this Contract are shown on the schedules on the following pages. The rates shown on these schedules are the minimum to be paid during the life of the Contract. It is, therefore, the responsibility of bidders to inform themselves as to the local labor conditions such as the length of the work day and work week, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of rates. In the event of conflict between the schedules for any classifications, the greater amount for the classification shall prevail as the minimum wage rate.

B. If the Contractor finds it necessary during the progress of the work to secure a minimum wage rate for some additional classification, he shall make a request for such additional classification to the Authority, who in turn will obtain the additional classification and corresponding minimum wage rate from the State Department of Labor and Industries and advise the Contractor of the same. These additional classifications and minimum wage rates are then to be considered a part of the Contract, and the Contractor shall have no claim for additional compensation because of the additional classification and minimum wage rates.

C. Where a question arises as to the classification in the schedule of the Department of Labor and Industries in which any employee is to be included, the decision is to be made by the State Department of Labor and Industries, through their duly authorized representative.

D. Within three days from the date of the first advertisement or call for bids, two or more employers of labor, or two or more members of a labor organization, or the awarding officer or official, or five or more residents of the town or towns where the public works are to be constructed, may appeal to the associate commissioners for a wage determination, or a classification of employment as made by the Commissioner, by serving on the Commissioner a written notice to that effect. Thereupon the Commissioner shall immediately cause the associate commissioners to hold a public hearing on the Commissioner's action appealed from. The associate commissioners shall render their decision not later than three (3) days after the closing of the hearing. The decision of a majority of the associate commissioners shall be final, and notice thereof shall be given forthwith to the awarding official or public body. (Section 27A, Chapter 149, General Laws, Commonwealth of Massachusetts).

E. Payments by employers to health and welfare plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided, (Section 26, Chapter 149, General Laws, Commonwealth of Massachusetts).

F. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans as provided in the previous section, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to health and welfare plan where such payments are included in said rates of wages shall pay the amount of said payments directly to each employee engaged in said construction. (Section 27, Chapter 149, General Laws, as amended).

G. The Contractor's attention is directed to further minimum wage provisions under Paragraph 8 of the Supplementary Conditions. In cases of conflict, the higher rate shall apply.

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
www.state.ma.us/dos

MITT ROMNEY
Governor
KERRY HEALEY
Lieutenant Governor

JANE C. EDMONDS
Director
ROBERT J. PREZIOSO
Deputy Director

The Massachusetts Prevailing Wage Law
M.G.L. ch. 149, §§ 26 - 27

NOTICE TO AWARDING AUTHORITIES

The enclosed wage schedule applies only to the specific project listed at the top and will remain in effect for the duration of the project.

You should request an updated wage schedule from the Division of Occupational Safety if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.

The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.

Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.

The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.

The enclosed wage schedule applies to all phases of the project including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.

All apprentices must be registered with the Massachusetts Division of Apprentice Training in order to be paid at the reduced apprentice rates. If a worker is not registered with the Division of Apprentice Training, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call (617) 727-3486 or write to the Division of Apprentice Training, 399 Washington Street, 4th Floor, Boston, MA 02108.

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENTS OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
www.mass.gov/dos

MITT ROMNEY
Governor
KERRY HEALEY
Lieutenant Governor
JANE C. EDMONDS
Director, DWD
ANGELO R. BUONOPANE
Director, DOL

ROBERT J. PREZIOSO
Commissioner

NOTICE

TO AWARDING AUTHORITIES AND CONTRACTORS
CONCERNING DRIVERS WHO HAUL
BITUMINOUS CONCRETE AND READY-MIX CONCRETE

All awarding authorities and contractors are hereby notified that drivers who deliver bituminous concrete and ready-mix concrete to public construction projects, for which a prevailing wage schedule dated on or after August 22, 2001 has been issued, are covered by the Prevailing Wage Law, Mass. G. L. c. 149, §§ 26 - 27D, while the drivers are on-site at the public construction project. Those drivers are not covered by the prevailing wage law while off-site, including over-the-road driving and picking-up materials.

This applicability determination is codified in a decision of the Department of Labor and Workforce Development, Division of Occupational Safety ("DOS") issued on August 21, 2001 pursuant to Mass. G. L. c. 149, § 27A. That decision was issued in response to an appeal brought by 88 contractor employers and the Construction Industries of Massachusetts who argued for the repeal of an administrative policy that had required bituminous drivers to be paid prevailing wage rates for time spent traveling over-the-road. That policy also required ready-mix drivers to be paid prevailing wage rates for time spent traveling over-the-road.

The August 21, 2001 decision reasons that the prevailing wage law limits DOS's authority to set wage rates for bituminous and ready-mix drivers to work they perform at public construction sites only. Under this decision, prevailing wage rates will no longer apply to the time that bituminous and ready-mix drivers spend traveling over-the-road in connection with a public construction project. However, prevailing wage rates will continue to apply to the time that drivers who haul gravel and fill spend traveling over-the-road, as specifically mandated by a 1973 amendment to the prevailing wage law.

The Massachusetts Supreme Judicial Court, in Construction Industries of Massachusetts v. Commissioner of Labor and Industries, 406 Mass. 162, 546 N.E. 2d 367 (1989), affirmed that bituminous drivers are more than just materialmen and must be paid prevailing wage rates while on-site, although it did not render an opinion on whether those drivers should be paid prevailing wage rates for the time spent traveling over-the-road. Where a case remains silent, it is the responsibility of the administrative agency to provide guidance. The August 21, 2001 decision makes clear that the prior administrative policy, which required coverage for bituminous and ready-mix drivers over-the-road as well as on-site, was an improper expansion of coverage under the statute.

Awarding officials are encouraged to make this notice available to all contractors who may be engaged in projects involving the delivery of bituminous concrete and ready-mix concrete. Contractors are encouraged to notify workers that they are required to be paid prevailing wage rates while on-site at the public construction project. Certified weekly payroll reports must be submitted to awarding officials for all workers on all applicable hours.

Copies of the decision are available from DOS. If you have any questions concerning this matter, contact DOS at (617) 727-3492.

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. This is required to be done on a weekly basis. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor or public body shall furnish to the Department of Labor & Workforce Development/Division of Occupational Safety within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 200_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

DIVISION OF OCCUPATIONAL SAFETY, 399 WASHINGTON STREET, 5TH FLOOR, BOSTON, MA. 02108

S10CN04
2004

SC-22(d)

WEEKLY PAYROLL REPORT FORM

Company Name:

Project Name:

Awarding Auth.:

Work Week Ending:

Prime Contractor

Subcontractor
List Prime Contractor:

Employer Signature:

Print Name & Title:

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A*F] Weekly Total Amount
											(C) Health & Welfare	(D) Pension	(E) Supp. Unemp		
		S	M	T	W	T	F	S							

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR
DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates			
(2 AXLE) DRIVER - EQUIPMENT	6/1/2004 $35.510	12/1/2004 $36.460	6/1/2005 $36.960	12/1/2005 $37.910
	6/1/2006 $38.410	12/1/2006 $39.360	6/1/2007 $39.860	12/1/2007 $40.810
	6/1/2008 $41.310	12/1/2008 $42.260		
(3 AXLE) DRIVER - EQUIPMENT/READY-MIX CONCRETE	6/1/2004 $35.580	12/1/2004 $36.530	6/1/2005 $37.030	12/1/2005 $37.980
	6/1/2006 $38.480	12/1/2006 $39.430	6/1/2007 $39.930	12/1/2007 $40.880
	6/1/2008 $41.380	12/1/2008 $42.330		
(4 & 5 AXLE) DRIVER - EQUIPMENT/READY-MIX CONCRETE	6/1/2004 $35.700	12/1/2004 $36.650	6/1/2005 $37.150	12/1/2005 $38.100
	6/1/2006 $38.600	12/1/2006 $39.550	6/1/2007 $40.050	12/1/2007 $41.000
	6/1/2008 $41.500	12/1/2008 $42.450		
AIRTRACK OPERATOR	6/1/2004 $36.450	12/1/2004 $37.550	6/1/2005 $38.700	12/1/2005 $39.800
	6/1/2006 $40.950	12/1/2006 $42.050	6/1/2007 $43.200	12/1/2007 $44.300
	5/31/2008 $44.800			
ASBESTOS REMOVER - PIPE / MECH. EQUIPT.	6/1/2004 $29.250			
ASPHALT RAKER	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE	6/1/2004 $46.410	12/1/2004 $47.590		
BACKHOE/FRONT-END LOADER	6/1/2004 $46.410	12/1/2004 $47.590		
BARCO-TYPE JUMPING TAMPER	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/6/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
BLOCK PAVER, RAMMER / CURB SETTER	6/1/2004 $36.450	12/1/2004 $37.550	6/1/2005 $38.700	12/1/2005 $39.800
	6/1/2006 $40.950	12/1/2006 $42.050	6/1/2007 $43.200	12/1/2007 $44.300
	5/31/2008 $44.800			
BOILERMAKER	1/1/2004 $46.170	10/1/2004 $47.170	10/1/2005 $48.170	
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	8/1/2004 $52.150	2/1/2005 $53.510	8/1/2005 $55.460	2/1/2006 $56.980
	8/1/2006 $59.040	2/1/2007 $60.690		
BULLDOZER/GRADER/SCRAPER	6/1/2004 $46.170	12/1/2004 $47.340		
CAISSON & UNDERPINNING BOTTOM MAN	12/1/2003 $35.000			
CAISSON & UNDERPINNING LABORER	12/1/2003 $34.050			
CAISSON & UNDERPINNING TOP MAN	12/1/2003 $34.050			
CARBIDE CORE DRILL OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
CARPENTER	4/1/2004 $46.570	10/1/2004 $47.820	4/1/2005 $49.070	
CEMENT MASONRY/PLASTERING	8/1/2004 $51.570	1/1/2005 $51.850	2/1/2005 $52.910	7/1/2005 $53.210
	8/1/2005 $54.720	1/1/2006 $55.010	2/1/2006 $56.180	8/1/2006 $57.780
	2/1/2007 $59.050			

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27
Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. ch. 149, sec. 27B. Employees not receiving such rates should report the violation to the Office of Fair Labor and Business Practices, 100 Cambridge Street , Boston, MA 02108; Tel: (617) 727-3465.

Issue Date: 9/24/2004 **Rate Sheet:** BOSTON **Job ID:** 91819 **Page:** 1

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR
DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates			
CHAIN SAW OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	6/1/2004 $47.410	12/1/2004 $48.590		
COMPRESSOR OPERATOR	6/1/2004 $38.730	12/1/2004 $39.660		
DELEADER (BRIDGE)	7/1/2004 $50.320	1/1/2005 $51.770	7/1/2005 $53.270	1/1/2006 $54.770
DIRECTIONAL DRILL MACHINE OPERATOR	6/1/2004 $46.170	12/1/2004 $47.340		
DIVER	8/1/2004 $55.340			
DIVER TENDER	8/1/2004 $44.370			
DIVER TENDER (EFFLUENT)	8/1/2004 $58.090			
DIVER/SLURRY (EFFLUENT)	8/1/2004 $74.540			
ELECTRICIAN	9/1/2004 $54.090	3/1/2005 $55.580	9/1/2005 $57.060	3/1/2006 $58.540
ELEVATOR CONSTRUCTOR	1/1/2004 $49.820	1/1/2005 $52.790	1/1/2006 $55.760	1/1/2007 $58.730
ELEVATOR CONSTRUCTOR HELPER	1/1/2004 $37.880	1/1/2005 $40.250	1/1/2006 $42.620	1/1/2007 $44.990
FENCE & GUARD RAIL ERECTOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
FIELD ENG. - INST. PERSON (BLDG, SITE, HVY CONST	5/1/2004 $43.860	11/1/2004 $44.990	5/1/2005 $46.130	
FIELD ENG. - ROD PERSON (BLDG, SITE, HVY CONST)	5/1/2004 $33.330	11/1/2004 $34.110	5/1/2005 $34.880	
FIELD ENG.-CHIEF OF PARTY (BLDG, SITE, HVY CONST)	5/1/2004 $45.050	11/1/2004 $46.220	5/1/2005 $47.400	
FIRE ALARM INSTALLER	9/1/2004 $54.090	3/1/2005 $55.580	9/1/2005 $57.060	3/1/2006 $58.540
FIRE ALARM REPAIR / MAINTENANCE	6/1/2003 $39.060			
FIREMAN (ASST. ENGINEER)	6/1/2004 $42.240	12/1/2004 $43.280		
FLAGGER & SIGNALER	6/1/2004 $29.800	12/1/2004 $30.900	6/1/2005 $32.050	12/1/2005 $33.150
	6/1/2006 $34.300	12/1/2006 $35.400	6/1/2007 $36.550	12/1/2007 $37.650
	5/31/2008 $38.150			
FLOORCOVERER	4/1/2004 $46.710	10/1/2004 $47.960	4/1/2005 $49.210	
FORK LIFT/CHERRY PICKER	6/1/2004 $46.410	12/1/2004 $47.590		
GENERATOR/LIGHTING PLANT/HEATERS	6/1/2004 $38.730	12/1/2004 $39.660		
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	7/1/2004 $46.360	1/1/2005 $47.560	7/1/2005 $48.810	1/1/2006 $50.060
HOISTING ENGINEER/CRANES/GRADALLS	6/1/2004 $46.410	12/1/2004 $47.590		
HVAC (DUCTWORK)	8/1/2004 $52.130	2/1/2005 $53.430		
HVAC (ELECTRICAL CONTROLS)	9/1/2004 $54.090	3/1/2005 $55.580	9/1/2005 $57.060	3/1/2006 $58.540
HVAC (PIPE)	9/1/2004 $53.350	3/1/2005 $54.850	9/1/2005 $56.350	3/1/2006 $57.850
HVAC (TESTING AND BALANCING - AIR)	8/1/2004 $52.130	2/1/2005 $53.430		
HVAC (TESTING AND BALANCING -WATER)	9/1/2004 $53.350	3/1/2005 $54.850	9/1/2005 $56.350	3/1/2006 $57.850

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27

Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. ch. 149, sec. 27B. Employees not receiving such rates should report the violation to the Office of Fair Labor and Business Practices, 100 Cambridge Street , Boston, MA 02108; Tel: (617) 727-3465.

Issue Date: 9/24/2004 **Rate Sheet:** BOSTON **Job ID:** 91819 **Page:** 2

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR

DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates			
HYDRAULIC DRILLS	6/1/2004 $36.450	12/1/2004 $37.550	6/1/2005 $38.700	12/1/2005 $39.800
	6/1/2006 $40.950	12/1/2006 $42.050	6/1/2007 $43.200	12/1/2007 $44.300
	5/31/2008 $44.800			
INSULATOR (PIPES & TANKS)	9/1/2004 $48.130	9/1/2005 $50.630		
IRONWORKER/WELDER	9/16/2004 $46.880			
JACKHAMMER & PAVING BREAKER OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
LABORER	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
LABORER: CARPENTER TENDER	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
LABORER: CEMENT FINISHER TENDER	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	12/1/2003 $36.150			
LABORER: MASON TENDER	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
LABORER: MULTI-TRADE TENDER	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
LABORER: TREE REMOVER	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
LASER BEAM OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
MARBLE & TILE FINISHERS	6/1/2004 $42.740	11/1/2004 $44.260	5/1/2005 $45.350	10/1/2005 $46.910
	4/1/2006 $48.130	9/1/2006 $49.780	3/1/2007 $51.100	
MARBLE MASONS,TILELAYERS & TERRAZZO MECH	6/1/2004 $50.290	11/1/2004 $52.190	5/1/2005 $53.550	10/1/2005 $55.500
	4/1/2006 $57.020	9/1/2006 $59.080	3/1/2007 $60.730	
MECH. SWEEPER OPERATOR (NON-CONSTRUCTION)	7/1/2004 $24.570	7/1/2005 $25.070	7/1/2006 $25.570	
MECH. SWEEPER OPERATOR (ON CONST. SITES)	6/1/2004 $46.170	12/1/2004 $47.340		
MECHANICS MAINTENANCE	6/1/2004 $46.170	12/1/2004 $47.340		
MILLWRIGHT	4/1/2004 $43.700			

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27

Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. ch. 149, sec. 27B. Employees not receiving such rates should report the violation to the Office of Fair Labor and Business Practices, 100 Cambridge Street , Boston, MA 02108; Tel: (617) 727-3465.

Issue Date: 9/24/2004 **Rate Sheet:** BOSTON **Job ID:** 91819 **Page:** 3

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR

DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates			
MORTAR MIXER	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
OILER (OTHER THAN TRUCKS,CRANES,GRADALLS)	6/1/2004 $34.300	12/1/2004 $35.080		
OILER (TRUCKS,CRANES,GRADALLS)	6/1/2004 $36.450	12/1/2004 $37.300		
OTHER POWER DRIVEN EQUIPMENT - CLASS II	6/1/2004 $46.170	12/1/2004 $47.340		
PAINTER (BRIDGES/TANKS)	7/1/2004 $50.320	1/1/2005 $51.770	7/1/2005 $53.270	1/1/2006 $54.770
PAINTER (SPRAY OR SANDBLAST, NEW) *	7/1/2004 $47.360	1/1/2005 $48.560	7/1/2005 $49.810	1/1/2006 $51.060
PAINTER (SPRAY OR SANDBLAST, REPAINT)	7/1/2004 $45.420	1/1/2005 $46.620	7/1/2005 $47.870	1/1/2006 $49.120
PAINTER (TRAFFIC MARKINGS)	6/1/2004 $35.700	12/1/2004 $36.800	6/1/2005 $37.950	12/1/2005 $39.050
	6/1/2006 $40.200	12/1/2006 $41.300	6/1/2007 $42.450	12/1/2007 $43.550
	5/31/2008 $44.050			
PAINTER / TAPER (BRUSH, NEW) *	7/1/2004 $46.360	1/1/2005 $47.560	7/1/2005 $48.810	1/1/2006 $50.060
PAINTER / TAPER (BRUSH, REPAINT)	7/1/2004 $44.420	1/1/2005 $45.620	7/1/2005 $46.870	1/1/2006 $48.120
PANEL & PICKUP TRUCKS DRIVER	6/1/2004 $35.340	12/1/2004 $36.290	6/1/2005 $36.790	12/1/2005 $37.740
	6/1/2006 $38.240	12/1/2006 $39.190	6/1/2007 $39.690	12/1/2007 $40.640
	6/1/2008 $41.140	12/1/2008 $42.090		
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	8/1/2004 $44.370			
PILE DRIVER	8/1/2004 $44.370			
PIPEFITTER & STEAMFITTER	9/1/2004 $53.350	3/1/2005 $54.850	9/1/2005 $56.350	3/1/2006 $57.850
PIPELAYER	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
PLUMBERS & GASFITTERS	9/1/2004 $54.000	3/1/2005 $55.500	9/1/2005 $57.000	3/1/2006 $58.500
PNEUMATIC CONTROLS (TEMP.)	9/1/2004 $53.350	3/1/2005 $54.850	9/1/2005 $56.350	3/1/2006 $57.850
PNEUMATIC DRILL/TOOL OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
POWDERMEN & BLASTER	6/1/2004 $36.700	12/1/2004 $37.800	6/1/2005 $38.950	12/1/2005 $40.050
	6/1/2006 $41.200	12/1/2006 $42.300	6/1/2007 $43.450	12/1/2007 $44.550
	5/31/2008 $45.050			
POWER SHOVEL/DERRICK/TRENCHING MACHINE	6/1/2004 $46.410	12/1/2004 $47.590		
PUMP OPERATOR (CONCRETE)	6/1/2004 $46.410	12/1/2004 $47.590		
PUMP OPERATOR (DEWATERING, OTHER)	6/1/2004 $38.730	12/1/2004 $39.660		
RECLAIMERS	6/1/2004 $46.170	12/1/2004 $47.340		
RESIDENTIAL WOOD FRAME CARPENTER **	4/1/2004 $33.170	10/1/2004 $33.670	4/1/2005 $34.170	
RIDE-ON MOTORIZED BUGGY OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27

Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. ch. 149, sec. 27B. Employees not receiving such rates should report the violation to the Office of Fair Labor and Business Practices, 100 Cambridge Street , Boston, MA 02108; Tel: (617) 727-3465.

Issue Date: 9/24/2004 **Rate Sheet:** BOSTON **Job ID:** 91819 **Page:** 4

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR

DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates			
ROLLER/SPREADER/MULCHING MACHINE	6/1/2004 $46.170	12/1/2004 $47.340		
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	8/1/2004 $42.110	2/1/2005 $43.360	8/1/2005 $44.860	2/1/2006 $46.360
SHEETMETAL WORKER	8/1/2004 $52.130	2/1/2005 $53.430		
SIGN ERECTOR	6/1/2004 $27.500	6/1/2005 $29.070		
SLATE / TILE / PRECAST CONCRETE ROOFER	8/1/2004 $42.360	2/1/2005 $43.610	8/1/2005 $45.110	2/1/2006 $46.610
SPECIALIZED EARTH MOVING EQUIP < 35 TONS	6/1/2004 $35.800	12/1/2004 $36.750	6/1/2005 $37.250	12/1/2005 $38.200
	6/1/2006 $38.700	12/1/2006 $39.650	6/1/2007 $40.150	12/1/2007 $41.100
	6/1/2008 $41.600	12/1/2008 $42.550		
SPECIALIZED EARTH MOVING EQUIP > 35 TONS	6/1/2004 $36.090	12/1/2004 $37.040	6/1/2005 $37.540	12/1/2005 $38.490
	6/1/2006 $38.990	12/1/2006 $39.940	6/1/2007 $40.440	12/1/2007 $41.390
	6/1/2008 $41.890	12/1/2008 $42.840		
SPRINKLER FITTER	9/16/2004 $54.750	1/1/2005 $54.750	3/16/2005 $55.750	9/16/2005 $57.750
	3/16/2006 $58.750			
STEAM BOILER OPERATOR	6/1/2004 $46.170	12/1/2004 $47.340		
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	6/1/2004 $46.170	12/1/2004 $47.340		
TELECOMMUNICATION TECHNICIAN	6/1/2003 $39.060			
TERRAZZO FINISHERS	6/1/2004 $49.190	11/1/2004 $51.090	5/1/2005 $52.450	10/1/2005 $54.400
	4/1/2006 $55.920	9/1/2006 $57.980	3/1/2007 $59.630	
TEST BORING DRILLER	12/1/2003 $35.450			
TEST BORING DRILLER HELPER	12/1/2003 $34.170			
TEST BORING LABORER	12/1/2003 $34.050			
TRACTORS/PORTABLE STEAM GENERATORS	6/1/2004 $46.170	12/1/2004 $47.340		
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2004 $36.380	12/1/2004 $37.330	6/1/2005 $37.830	12/1/2005 $38.780
	6/1/2006 $39.280	12/1/2006 $40.230	6/1/2007 $40.730	12/1/2007 $41.680
	6/1/2008 $42.180	12/1/2008 $43.130		
TUNNEL WORK (COMP. AIR HAZ. WASTE)	12/1/2003 $46.630			
TUNNEL WORK (COMPRESSED AIR)	12/1/2003 $44.630			
TUNNEL WORK (FREE AIR HAZ. WASTE)	12/1/2003 $38.700			
TUNNEL WORK (FREE AIR)	12/1/2003 $36.700			
VAC-HAUL	6/1/2004 $35.800	12/1/2004 $36.750	6/1/2005 $37.250	12/1/2005 $38.200
	6/1/2006 $38.700	12/1/2006 $39.650	6/1/2007 $40.150	12/1/2007 $41.100
	6/1/2008 $41.600	12/1/2008 $42.550		
WAGON DRILL OPERATOR	6/1/2004 $35.950	12/1/2004 $37.050	6/1/2005 $38.200	12/1/2005 $39.300
	6/1/2006 $40.450	12/1/2006 $41.550	6/1/2007 $42.700	12/1/2007 $43.800
	5/31/2008 $44.300			
WASTE WATER PUMP OPERATOR	6/1/2004 $46.410	12/1/2004 $47.590		
WATER METER INSTALLER	9/1/2004 $54.000	3/1/2005 $55.500	9/1/2005 $57.000	3/1/2006 $58.500

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27

Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. ch. 149, sec. 27B. Employees not receiving such rates should report the violation to the Office of Fair Labor and Business Practices, 100 Cambridge Street , Boston, MA 02108; Tel: (617) 727-3465.

Issue Date: 9/24/2004 **Rate Sheet:** BOSTON **Job ID:** 91819 **Page:** 5

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR

DIVISION OF OCCUPATIONAL SAFETY

Prevailing Wage Rates

As determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MITT ROMNEY
Govenor
KERRY HEALEY
Lt. Govenor

ANGELO R. BUONOPANE
Director
ROBERT J. PREZIOSO
Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.
** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement.

This wage schedule must be posted at the work site in accordance with M.G.L. ch. 149, sec. 27

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THE COMMONWEALTH OF MASSACHUSETTS
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Commissioner

Awarding Authority: M.B.T.A.
Contract Number: S10CN04 **City/Town:** BOSTON
Description Of Work: MAVERICK STATION/BLUE LINE VENTS RENOVATIONS WORK
Job Location: 220 SUMNER STREET

Classification	Effective Dates and Total Rates	
EQUIPMENT OPERATOR	8/29/2004 $38.690	8/28/2005 $40.430
GROUNDMAN / TRUCK DRIVER	8/29/2004 $33.750	8/28/2005 $35.280
JOURNEYMAN LINEMAN	8/29/2004 $43.630	8/28/2005 $45.580
TELEDATA CABLE SPLICER	1/1/2003 $27.360	
TELEDATA LINEMAN/EQUIPMENT OPERATOR	1/1/2003 $26.060	
TELEDATA WIREMAN/INSTALLER/TECHNICIAN	1/1/2003 $26.060	

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Issue Date: 9/24/2004 **Rate Sheet:** OUTSIDE ELECT-EAST **Job ID:** 91820 **Page:** 1

COMMONWEALTH OF MASSACHUSETTS

Division of Occupational Safety

Minimum wage rates for apprentices employed on public works projects are listed below as a percentage of the pre-determined hourly wage rate established by the Deputy Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 through 27D, as ammended

All apprentices must be registered with the Division of Apprentice Training in accordance with M.G.L. Chapter 23, Sections 11E-11L

Location: BOSTON

All steps are 6 months (1000 Hours) unless otherwise specified**

Classification	Ratio*	1	2	3	4	5	6	7	8	9	10
ASBESTOS INSULATOR (Pipes & Tanks)	1:4	50	60	70	80						
		Steps are 1 year									
BOILERMAKER	1:5	65	65	70	75	80	85	90	95		
BRICK/PLASTER/CEMENT MASON	1:5	50	60	70	80	90					
CARPENTER	1:5	50	60	70	75	80	80	90	90		
CARPENTER (Residential Wood Frame)	1:5	60	60	65	70	75	80	85	90		
ELECTRICIAN	2:3***	30	35	40	45	50	55	65	70	75	80
		App. Start 2003+:40/40/45/45/50/55/60/65/70/75									
ELEVATOR CONSTRUCTOR	1:1	50	55	65	70	80					
		Steps 1-2 are 6 mos.; Steps 3-5 are 1 year									
FLOORCOVERER	1:1	50	55	60	65	70	75	80	85		
		Steps are 950 hrs.									
GLAZIER	1:1	50	55	60	65	70	75	80	90		
		Steps are 750 hrs.									
HOIST/PORT. ENG.	1:5	55	60	65	70	75	80	85	90		
IRONWORKER		60	70	75	80	85	90				
Structural 1:6; Ornamental 1:4											
LABORER	1:5	60	70	80	90						
MARBLE-TILE-TERRAZZO FINISHER	1:3	50	60	70	80	90					
		Steps are 800 hrs.									
MARBLE-TILE-TERRAZZO MECHANIC	1:3	50	60	70	80	90					
MILLWRIGHT	1:5	50	55	60	65	70	75	80	85		

* Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof.

** Multiple ratios are listed in comment field.

*** The job site ratio of 2 apprentices for every 3 journeymen is allowed as follows: 1 journeyman may supervise not more than 1 apprentice; 2 to 3 journeymen may supervise not more than 2 apprentices; 4 to 6 journeymen may supervise not more than 4 apprentices; 7 to 9 journeymen may supervise not more than 6 apprentices; 10 to 12 journeymen may supervise not more than 8 apprentices; 13 to 15 journeymen may supervise not more than 10 apprentices; etc. Not more than 50% of the apprentices on a job site may have standing as a 1st year apprentice. All other apprentices must have 2nd, 3rd, 4th, or 5th year standing.

Issue Date: 9/24/2004

COMMONWEALTH OF MASSACHUSETTS

Division of Occupational Safety

Minimum wage rates for apprentices employed on public works projects are listed below as a percentage of the pre-determined hourly wage rate established by the Deputy Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 through 27D, as ammended

All apprentices must be registered with the Division of Apprentice Training in accordance with M.G.L. Chapter 23, Sections 11E-11L

Location: BOSTON

		All steps are 6 months (1000 Hours) unless otherwise specified**									
PAINTER	1:1	50	55	60	65	70	75	80	90		
		Steps are 750 hrs.									
PILE DRIVER	1:3	60	65	70	75	80	85	90	95		
PIPEFITTER		40	45	60	70	80					
** 1:3; 3:15; 1:10 thereafter		Steps are 1 year									
PLUMBER		35	40	55	65	75					
** 1:2; 2:6; 3:10; 4:14; 5:19		Step 4 w/ license - 70; Step 5 w/ license - 80									
ROOFER		50	60	65	75	85					
1:5, 2:6 -10 thereafter		Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.									
SHEET METAL WORKER	1:4	40	45	50	60	65	75	85			
		Steps 1-3 are 1 year; Steps 4-7 are 6 mos.									
SIGN ERECTOR	1:1	50	55	60	65	70	75	80	85	90	
		Steps are 4 mos.									
SPRINKLER FITTER	1:1	40	45	50	55	60	65	70	75	80	85
TELECOMMUNICATION TECHNICIAN	1:1	40	45	50	55	60	65	75	80		

* Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof.

** Multiple ratios are listed in comment field.

*** The job site ratio of 2 apprentices for every 3 journeymen is allowed as follows: 1 journeyman may supervise not more than 1 apprentice; 2 to 3 journeymen may supervise not more than 2 apprentices; 4 to 6 journeymen may supervise not more than 4 apprentices; 7 to 9 journeymen may supervise not more than 6 apprentices; 10 to 12 journeymen may supervise not more than 8 apprentices; 13 to 15 journeymen may supervise not more than 10 apprentices; etc. Not more than 50% of the apprentices on a job site may have standing as a 1st year apprentice. All other apprentices must have 2nd, 3rd, 4th, or 5th year standing.

Issue Date: 9/24/2004

8. U.S.A. DOT Federal Transit Administration Contract Requirements

U.S.A. DOT Federal Transit Administration Contract Requirements

A.	General
B.	Disadvantaged Business Enterprise
C.	Title VI of the Civil Rights Act of 1964
D.	Energy Conservation
E.	Cargo Preference
F.	Audit and Inspection
G.	Environmental, Resource Conservation, Energy Requirements, Seismic Safety, Clean Water and Recycled Products
H.	Notice of Federal Regulations
I.	Record Retention
J.	ADA
K.	Buy America Certification
L.	Fly America
M.	No Obligation by the Federal Government
N.	Program Fraud and False or Fraudulent Statements and Related Acts
O.	Termination
P.	Remedies/Breach of Contract
Q.	Integrity Certification
R.	Lobbying
S.	Nondiscrimination
T.	Liquidated Damages
U.	Labor Provisions
V.	Interests of Members of Congress
W.	Debarred Bidders
X.	Insurance / Bonding
Y.	Project Signs
Z.	Certified Payroll - Construction Projects
AA.	Minority Business Enterprise
BB.	MBE Obligation
CC.	Minimum Federal Wage Rates
DD.	Equal Employment Opportunity (EEO)

Standard Federal Equal Employment Opportunity
Construction Contract Specification

Appx. No.1 - Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity

A. GENERAL

1. These Contract provisions shall apply to all Work performed on the Contract by the Contractor's own organization and with the assistance of workers under the Contractor's immediate superintendence and to all Work performed on the Contract by piecework, station work, or by Subcontract.

2. Except as otherwise provided for in each Section, the Contractor shall insert in each Subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier Subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with these Required Contract Provisions.

3. A breach of the following clauses of the Required Contract Provisions shall be sufficient grounds for termination of the Contract.

B. DISADVANTAGED BUSINESS ENTERPRISE

THE (CONTRACTOR OR SUBCONTRACTOR AND ITS THIRD PARTY CONTRACTORS) SHALL NOT DISCRIMINATE ON THE BASIS OF RACE, COLOR, NATIONAL ORIGIN, AGE, OR SEX IN THE PERFORMANCE OF THIS (CONTRACT OR AGREEMENT). THE REQUIREMENTS OF 49 C.F.R. PART 23 AND THE AUTHORITY'S U.S. DOT-APPROVED DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM (WHERE REQUIRED) ARE INCORPORATED IN THIS (CONTRACT AGREEMENT) BY REFERENCE. FAILURE BY THE (CONTRACTOR OR SUBCONTRACTOR AND ITS THIRD PARTY CONTRACTORS) TO CARRY OUT THESE REQUIREMENTS IS A MATERIAL BREACH OF THE (CONTRACT OR AGREEMENT), WHICH MAY RESULT IN THE TERMINATION OF THIS (CONTRACT OR AGREEMENT) OR SUCH OTHER REMEDY AS THE AUTHORITY DEEMS APPROPRIATE.

*** ***(THIRD PARTY CONTRACTING REFERS TO CONTRACTING BY AUTHORITY USING FEDERAL ASSISTANCE).***

C. TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

The Contractor agrees to comply with, and assure the compliance by its subcontractors and third party contractors under this Project, with all requirements of Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d; U.S. DOT regulations, "Nondiscrimination in Federally Assisted Programs of the Department of Transportation -- Effectuation of Title VI of the Civil Rights Act," 49 C.F.R. Part 21.

D. ENERGY CONSERVATION

The Contractor, Subcontractors and its third party contractors shall comply with mandatory standards and policies relating to energy efficiency that are contained in applicable State energy conservation plans issued in compliance with Energy Policy and Conservation Act, U.S.C. §§ 6321 et seq.

E. CARGO PREFERENCE - USE OF UNITED STATES FLAG VESSELS

As required by 46 C.F.R. PART 381, the Contractor agrees --

1. TO UTILIZE PRIVATELY OWNED UNITED STATES-FLAG COMMERCIAL VESSELS TO SHIP AT LEAST 50 PERCENT OF THE GROSS TONNAGE (COMPUTED SEPARATELY FOR DRY BULK CARRIERS, DRY CARGO LINERS,

AND TANKERS) INVOLVED, WHENEVER SHIPPING ANY EQUIPMENT, MATERIALS, OR COMMODITIES PURSUANT TO THIS CONTRACT TO THE EXTENT SUCH VESSELS ARE AVAILABLE AT FAIR AND REASONABLE RATES FOR UNITED STATES-FLAG COMMERCIAL VESSELS.

2. TO FURNISH WITHIN 20 DAYS FOLLOWING THE DATE OF LOADING FOR SHIPMENTS ORIGINATING WITHIN THE UNITED STATES, OR WITHIN 30 WORKING DAYS FOLLOWING THE DATE OF LOADING FOR SHIPMENTS ORIGINATING OUTSIDE THE UNITED STATES, A LEGIBLE COPY OF A RATED, "ON-BOARD" COMMERCIAL OCEAN BILL-OF-LADING IN ENGLISH FOR EACH SHIPMENT OF CARGO DESCRIBED IN PARAGRAPH (1) ABOVE TO THE CONTRACTOR (THROUGH THE PRIME CONTRACTOR IN THE CASE OF SUBCONTRACTOR BILLS-OF-LADING) AND TO THE DIVISION OF NATIONAL CARGO, OFFICE OF MARKET DEVELOPMENT, MARITIME ADMINISTRATION, 400 SEVENTH STREET, S.W., WASHINGTON, D.C. 20590, MARKED WITH APPROPRIATE IDENTIFICATION OF THE PROJECT.

3. TO INSERT THE SUBSTANCE OF THE PROVISIONS OF THIS CLAUSE IN ALL SUBCONTRACTS ISSUED PURSUANT TO THIS CONTRACT.

F. AUDIT AND INSPECTION

Inspection by Federal Officials. The Contractor agrees to permit the Secretary of Transportation (Secretary) and the Comptroller General of the United States, or their authorized representatives, to inspect all Project work, materials, payrolls, and other data, and to audit the books, records, and accounts of the Contractor and its subcontractors pertaining to the Project. The Contractor agrees to require each third party contractor whose contract award is not based on competitive bidding procedures as defined by the Secretary to permit the Secretary of Transportation and the Comptroller General of the United States, or their duly authorized representatives, to inspect all work, materials, payrolls, and other data and records involving that contract, and to audit the books, records, and accounts involving that contract as it affects the Project.

G. ENVIRONMENTAL, RESOURCE CONSERVATION, and ENERGY REQUIREMENTS

The Authority recognizes that many Federal and State statutes imposing environmental, resource conservation, and energy requirements may apply to the Project, Some, but not all, of the major Federal laws that may affect the Project include: the National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321 et seq. the Clean Air Act, as amended, 42 U.S.C. 7401 et seq. and scattered sections of 29 U.S.C.; the Clean Water Act, as amended, scattered sections of 33 U.S.C. and 12 U.S.C.; the Resource Conservation and Recovery Act, as amended, 42 U.S.C. §§ 6901 et seq.; and the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9601 et seq. The Authority also recognizes that the Environmental Protection Agency (EPA), the Federal Highway Administration (FHWA) and other agencies of the Federal Government have issued and are expected in the future to issue requirements in the form of regulations, guidelines, standards, orders, or other directives that may affect the Project. Accordingly, the Authority agrees to adhere to, and impose on its contractors and subcontractors, any such Federal requirements, as the Federal Government may now or in the future promulgate. Listed below are requirements of particular concern to FTA. The Authority expressly understands that this list does not constitute the Authority's entire obligation to meet Federal requirements.

1. Environmental Protection

The Contractor, Subcontractor and its third party contractors agree to comply with applicable requirements of the National Environmental Policy Act of 1969, as amended, 42 U.S.C. §§

4321 et seq.; section 14 of the Federal Transit Act, as amended, 49 U. S.C. app. §§ 1610, Council on Environmental Quality regulations, 40 C.F.R. Part 1500 et seq.; and joint FHWA/FTA regulations, "Environmental Impact and Related Procedures," at 23 C.F.R. Part 771 and 49 C.F.R. Part 622.

2. **Air Quality**

The Contractor, Subcontractors and its third party contractors agree to comply with applicable requirements of EPA regulations, "Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 21 U.S.C. of the Federal Transit Act," 40 C.F.R. Part 51, Subpart T; and "Determining Conformity of Federal Actions to State or Federal Implementation Plans," 40 C.F.R. Part 93. To support the requisite air quality conformity finding for the Project, the Contractor, Subcontractors and its third party contractors agree to implement each air quality mitigation and control measure incorporated in the Project. The Authority agrees that any Project identified in an applicable State Implementation Plan (SIP) as a Transportation Control Measure, will be wholly consistent with the description of the design concept and scope of the Project set forth in the SIP.

EPA also imposes requirements pertaining to the Clean Air Act, as amended, that may apply to transit operators, particularly operators of large transit bus fleets. Thus, the Authority should be aware that the following EPA regulations, among others, may apply to its Project: "Control of Air Pollution from Motor Vehicles and Motor Vehicle Engines, " 40 C.F.R. Part 85; "Control of Air Pollution from New and In-Use Motor Vehicles and New and In-Use-Motor Vehicle Engines: Certification and Test Procedures," 40 C.F.R. Part 86; and "Fuel Economy of Motor Vehicles," 40 C-F.R. Part 600.

3. **Use of Public Lands**

No publicly owned land from a park, recreation area, or wildlife or waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, State, or local significance may be used for the Project unless specific findings required by 49 U.S.C. § 303 are made by U.S. DOT.

4. **Historic Preservation**

The Authority agrees to assist the Federal Government and comply with section 106 of the National Historic Preservation Act, 16 U, S.C. § 470f, involving historic and archaeological preservation by:

a. Consulting the State Historic Preservation Officer on the conduct of investigations, in accordance with Advisory Council on Historic Preservation regulations, "Protection of Historic and Cultural Properties," 36 C.F.R. Part 800, to identify properties and resources listed in or eligible for inclusion in the National Register of Historic Places that may be affected by the Project, and notifying the Federal Government (FTA) of the existence of any such properties; and

b. Complying with all Federal requirements to avoid or mitigate adverse effects upon such properties.

5. **Energy Conservation**

The Contractor, Subcontractors and its third party contractors shall comply with mandatory standards and policies relating to energy efficiency that are contained in applicable State energy conservation plans issued in compliance with the Energy Policy and Conservation Act, 42 U.S.C. §§ 6321 et seq.

6. **Mitigation of Adverse Environmental Effects**

Should the proposed Project cause adverse environmental effects, the Authority agrees to take all reasonable steps to minimize such effects pursuant to 49 U.S.C. app. § 1610, all other applicable statutes, and the procedures set forth in 23 C.F.R. Part 771 and 49 C.F.R. Part 622. The Authority agrees to undertake all environmental mitigation measures that may be identified as commitments in applicable Environmental documents (such as environmental assessments, environmental impact statements, memoranda of agreement, and statements required by 49 U.S.C. § 303) and with any conditions imposed by the Federal Government as part of a finding of no significant impact or a record of decision; all such mitigation measures are incorporated in and made part of this Contract, the December 1993 FTA Grant Agreement with the MBTA (Agreement), by reference. As soon as the Federal Government and the Authority reach agreement on any mitigation measures that have been deferred, those measures will then be incorporated into this Agreement. Such mitigation measures may not be modified or withdrawn without the express written approval of the Federal Government.

7. The Contractor, Subcontractors and its third party contractors with all applicable standards, orders, or requirements issued under section 306 of Clear Air Act (42 U.S.C. 1857(h), section 508 of the Clear Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15) (Contracts, Subcontracts, and subgrants of amounts in excess of $100,000).

8. **Seismic Safety**

The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

9. **Clean Water**

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

10. **Recovered Materials**

The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited

to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

H. NOTICE OF FEDERAL REQUIREMENTS

The Contractor is advised that Federal requirements applicable to this contract as set forth in federal law, regulations, policies, and related administrative practices may change during the performance of this contract. Any such changes shall also apply to this contract.

I. RECORD RETENTION

Retention of all required records for 6 years after the MBTA makes final payment and all other pending matters are closed. **[Refer to Authority's General Conditions Article 5.27].**

J. ADA - Access Requirements for Individuals with Disabilities

The Contractor agrees to comply with, and assure that any subcontractor and third party contractors, under this Project comply with all applicable requirements of the Americans with Disabilities Act Of 1990 (ADA), 42 U.S.C. §§ 12101 et seq.; section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794; section 16 of the Federal Transit Act, as amended, 49 U.S.C. app. §1612; and the following regulations and any amendments thereto:

1. U.S. DOT regulations, "Transportation Services for Individuals with Disabilities (ADA), 49 C.F.R. Part 37;

2. U.S. DOT regulations, "Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance," 49 C.F.R. Part 27;

3. U.S. DOT regulations, " Americans With Disabilities (ADA) Accessibility Specifications for Transportation Vehicles, " 49 C.F.R. Part 38;

4. Department of Justice (DOJ) regulations, "Nondiscrimination on the Basis of Disability in State and Local Government Services," 28 C.F.R., Part 35;

5. DOJ regulations, "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities," 28 C.F.R. Part 36.

6. General Services Administration regulations, "Accommodations for the Physically Handicapped," 41 C.F.R. Subpart 101-19;

7. Equal Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630;

8. Federal Communications Commission regulations, "Telecommunications Relay Services and Related Customer Premises Equipment for the Hearing and Speech Disabled," 47 C.F.R. Part 64, Subpart F; and

9. FTA regulations, "Transportation for Elderly and Handicapped Persons," 49 C.F.R. Part 609.

K. BUY AMERICA CERTIFICATION

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 CFR Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded

projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 CFR 661.7, and include microcomputer equipment, software, and small purchases (currently less than $100,000) made with capital, operating, or planning funds.

A bidder or offeror must submit to the FTA Authority the appropriate Buy America certification (below) with all bids on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors. ***[For Certification Forms, refer to Bid Form].***

L. FLY AMERICA

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

M. NO OBLIGATION BY THE FEDERAL GOVERNMENT

(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

N. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq . and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

O. TERMINATION

Termination for cause and convenience by the grantee for subgrantee including the manner by which it will be affected and the basis for settlement, (all contracts in excess of $10,000). ***[Refer to Authority's General Conditions and Supplementary Conditions].***

P. REMEDIES / BREACH OF CONTRACT

Administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as may be appropriate. ***[Refer to Authority's General Conditions and Supplementary Conditions].***

Q. INTEGRITY CERTIFICATION

1. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion. ***[Refer to Bid Form]***

   a. Instructions for Certification - Primary Covered Transactions: (Applicable to all Federal contracts - 49 C.F.R. Part 29).

   1. By signing and submitting this Proposal, the prospective participant is providing the certification set out below.

   2. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of this prospective primary participate to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

   3. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

   4. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if at any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

5. The terms "covered transaction," "debarred", "suspended," "ineligible," "lower tier covered," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntary excluded," as used in this clause, have the meanings set out in this Definitions and Coverage Sections of rules implementing Executive Order 12549. You may contact the department or agency to which this Proposal is submitted for assistance in obtaining a copy of those regulations.

6. The prospective primary participant agrees by submitting this Proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared in eligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this agreement.
7. The Prospective primary participant further agrees by submitting this Proposal that it will include this clause titled "Certification regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction, " without modification, in all lower tier covered transactions and in all solicitations for lowered tier covered transactions.

8. A participation in a covered transaction may relay upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement of the "List of Parties Excluded From Federal Procurement of Nonprocurement" (Nonprocurement List) which is compiled by the General Services Administration.

9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

10. Except for transactions authorized under paragraph(f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion - Primary Covered Transactions ***[Refer to Bid Form]***

a. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principle:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any federal department or agency;

2. Have not within a 3 year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction of contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1b) of this certification.

4. Have not within a 3 year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default

b. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

c. Instructions for Certification - Lower Tier Covered Transactions: (Applicable to all subcontracts, purchase orders and other tier transactions of $25,000 or more -49 C.F.R. 29).

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

2. The certification in this clause in a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

4. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, have meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this proposal that it will include in this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participation in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph (e) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

d. The prospective lower tier participant certifies, by submission of this proposal, that neither it not its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

e. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

R. LOBBYING CERTIFICATION

Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient. ***[Refer to Bid Form]***.

S. NONDISCRIMINATION - Pursuant to Department of Labor regulations at 41 C.F.R. §§ 60-1.4(b)(1) and 60-1.4(c):

1. DURING THE PERFORMANCE OF THIS CONTRACT, THE CONTRACTOR AGREES AS FOLLOWS:

   a. THE CONTRACTOR WILL NOT DISCRIMINATE AGAINST ANY EMPLOYEE OR APPLICANT FOR EMPLOYMENT BECAUSE OF RACE, COLOR, RELIGION, SEX, AGE, DISABILITY, OR NATIONAL ORIGIN. THE CONTRACTOR WILL TAKE AFFIRMATIVE ACTION TO ENSURE THAT APPLICANTS ARE EMPLOYED, AND THAT EMPLOYEES ARE TREATED DURING EMPLOYMENT WITHOUT REGARD TO THEIR RACE, COLOR, RELIGION, SEX, AGE, DISABILITY OR NATIONAL ORIGIN. SUCH ACTION SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: EMPLOYMENT, UPGRADING, DEMOTION, OR TRANSFER; RECRUITMENT OR RECRUITMENT ADVERTISING; LAYOFF OR TERMINATION; RATES OF PAY OR OTHER FORMS OF COMPENSATION; AND SELECTION FOR TRAINING, INCLUDING APPRENTICESHIP. THE CONTRACTOR AGREES CONSPICUOUS PLACES, AVAILABLE TO EMPLOYEES AND APPLICANTS FOR EMPLOYMENT, NOTICES TO BE PROVIDED, SETTING FORTH THE PROVISIONS OF THIS NONDISCRIMINATION CLAUSE.

b. THE CONTRACTOR WILL, IN ALL SOLICITATIONS OR ADVERTISEMENTS FOR EMPLOYEES PLACED BY OR ON BEHALF OF THE CONTRACTOR, STATE THAT ALL QUALIFIED APPLICANTS WILL RECEIVE CONSIDERATION FOR EMPLOYMENT WITHOUT REGARD TO RACE, COLOR, RELIGION, SEX, AGE, DISABILITY, OR NATIONAL ORIGIN.

c. THE CONTRACTOR WILL SEND TO EACH LABOR UNION OR REPRESENTATIVE OF WORKERS WITH WHICH IT HAS A COLLECTIVE BARGAINING AGREEMENT OR OTHER CONTRACT OR UNDERSTANDING, A NOTICE TO BE PROVIDED ADVISING THE LABOR UNION OR WORKERS REPRESENTATIVE OF THE CONTRACTOR'S COMMITMENTS UNDER SECTION 202 OF EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24, 1965, AND SHALL POST COPIES OF THE NOTICE IN CONSPICUOUS PLACES AVAILABLE TO EMPLOYEES AND APPLICANTS FOR EMPLOYMENT.

d. THE CONTRACTOR WILL COMPLY WITH ALL PROVISIONS OF EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24,1965, AND OF THE RULES, REGULATIONS, AND RELEVANT ORDERS OF THE SECRETARY OF LABOR.

e. THE CONTRACTOR WILL FURNISH ALL INFORMATION AND REPORTS REQUIRED BY EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24,1965, AND BY THE RULES, REGULATIONS, AND ORDERS OF THE SECRETARY OF LABOR, OR PURSUANT THERETO, AND WILL PERMIT ACCESS TO ITS BOOKS, RECORDS AND ACCOUNTS BY THE SECRETARY OF LABOR AND THE FEDERAL TRANSIT ADMINISTRATION (FTA) FOR PURPOSES OF INVESTIGATION TO ASCERTAIN COMPLIANCE WITH SUCH RULES, REGULATIONS, AND ORDERS.

f. IN THE EVENT OF THE CONTRACTOR'S NONCOMPLIANCE WITH THE NONDISCRIMINATION CLAUSES OF THIS AGREEMENT OR WITH ANY OF SUCH RULES, REGULATIONS, OR ORDERS, THIS AGREEMENT MAY BE CANCELED, TERMINATED, OR SUSPENDED IN WHOLE OR IN PART AND THE CONTRACTOR MAY BE DECLARED INELIGIBLE FOR FURTHER FEDERAL OR FEDERALLY ASSISTED CONTRACTS IN ACCORDANCE WITH PROCEDURES AUTHORIZED IN EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24, 1965, AND SUCH OTHER SANCTIONS MAY BE IMPOSED AND REMEDIES INVOKED AS PROVIDED IN EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24, 1965, OR BY RULE, REGULATION, OR ORDER OF THE SECRETARY OF LABOR, OR AS OTHERWISE PROVIDED BY LAW.

g. THE CONTRACTOR WILL INCLUDE THE PROVISIONS OF PARAGRAPHS(a) THROUGH (g) OF THIS SUBSECTION IN EVERY SUBCONTRACT OR PURCHASE ORDER UNLESS EXEMPTED BY RULES, REGULATIONS, OR ORDERS OF THE SECRETARY OF LABOR ISSUED PURSUANT TO SECTION 204 OF EXECUTIVE ORDER NO. 11246 OF SEPTEMBER 24,1965, SO THAT SUCH PROVISIONS SHALL BE BINDING UPON EACH SUBCONTRACTOR OR VENDOR. THE CONTRACTOR WILL TAKE SUCH ACTION WITH RESPECT TO ANY SUBCONTRACT OR PURCHASE ORDER AS THE SECRETARY OF LABOR OR FTA MAY DIRECT AS A MEANS OF ENFORCING SUCH PROVISIONS, INCLUDING SANCTIONS FOR NONCOMPLIANCE; PROVIDED, HOWEVER, THAT IF A CONTRACTOR BECOMES INVOLVED IN, OR IS THREATENED WITH, LITIGATION WITH A SUBCONTRACTOR OR VENDOR AS A RESULT OF SUCH DIRECTION, THE CONTRACTOR MAY REQUEST THE UNITED STATES TO ENTER INTO SUCH LITIGATION TO PROTECT THE INTERESTS OF THE UNITED STATES.

T. LIQUIDATED DAMAGES

[Refer to Authority's General Conditions].

U. LABOR PROVISIONS.

1. Labor Provisions - Construction

a. Minimum Wages

(1) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at the time of payment computed at rates not less than those contained in the Wage Determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1 (b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a) (1) (iv) of 29 CFR Sec. 5.5; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Sec. 5.5 (a) (4).

Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a) (1) (ii) of 29 CFR Sec. 5.5 and the Davis-Bacon Poster (WH-132) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(2) The Contracting Office shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The Contracting Office shall approve an additional classification and wage rate and fringe benefits therefor, only when the following criteria have been met:

(a) The work to be performed by the classification requested is not performed by a classification in the wage determination: and

(b) The classification is utilized in the area by the construction industry: and

(c) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administration of the Wage and hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within a 30 day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(5) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraph (a) (1) (B) or (C) of 29 CFR Sec. 5.5 shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(6) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(7) If the Contractor does not make payments to a trustee or other third person the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found upon the written request of the Contractor that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(8) (A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(a) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(b) The classification is utilized in the area by the construction industry; and

(c) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification

and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

2. **Withholding**

DOT shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal Contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments of advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the Department of Transportation may, after written notice to the Contractor, sponsor, applicant, or owner, take such any further payment, advance, or guarantee of funds until such violations have ceased.

3. **Payrolls and Basic Records**

a. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949 in the construction or development of the project). Such records shall contain the name, address, and social security number of each worker, his or her correct classification, hourly rates of wages paid including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof the types described in Section 1 (b) (2) (B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid.

Whenever the Secretary of Labor has found under 29 CFR Sec. 5.5 (a) (1) (iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated

in providing benefits under a plan or program described in Section 1 (b) (2) (b) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program has been communicated in writing to the labors or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices and trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. The Contractor shall submit weekly for each week in which any Contract work is performed a copy of all payrolls to the Department of Transportation if the Department of Transportation is a party to the Contract, but if the Department of Transportation is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Department of Transportation. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under Sec. 5.5 (a) (3) (I) of regulations, 29 CFR Part 5. This information may be submitted in any form desired. Optional form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

c. Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

   (1) That the payroll for the payroll period contains the information required to be maintained under Sec. 5.5 (a) (3) (I) of regulations, 29 CFR Part 5 and that such information is correct and complete.

   (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in regulations, 29 CFR Part 3.

   (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

d. The weekly submission of a properly executed certification set forth on the reverse side of Optional form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a) (3) (ii) (b) of 29 CFR Sec. 5.5.

e. The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

f. The Contractor or subcontractor shall make the records required under paragraph (a) (3) (I) of 29 CFR Sec. 5.5 available for inspection, copying, or transcription by authorized representatives of the Department of Transportation or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make

them available, the Federal Agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Sec. 5.12.

4. **Apprentices and Trainees - Apprentices**

a. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training, or with a State Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on the payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above shall not be paid less than the applicable wage determination for the work actually performed. In addition, any apprentice performing work on the job site in excess of the ration permitted under the registered program shall not be paid less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits, in accordance with the provisions of the apprentice program. If the apprentice program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an Apprenticeship Program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. **Trainees** Except as provided in 29 CFR Sec. 5.16, Trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidence by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provision of the trainees program. If the trainees program does not mention fringe benefits, trainees shall be paid the full amount

of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman's wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the employment and training administration shall not be paid less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ration permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. **Equal Employment Opportunity** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the Equal Employment Opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. **Compliance with Copeland Act Requirements**

The Contractor shall comply with the requirements of the 29 CFR Part 3, which are incorporated by reference.

6. **Subcontracts**

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. **Contract Termination: Debarment**

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. **Compliance with Davis-Bacon and Related Act Requirements**

All rulings and interpretations of the Davis-Bacon and related acts contained in 29 CFR Parts 1,3 and 5 are herein incorporated by reference in this contract.

9. **Disputes Concerning Labor Standards**

Disputes arising out of the Labor Standards Provisions of this Contract shall not be subject to the general disputes clause of the Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the Contracting Agency, the U.S. Department of Labor, or the employees or their representatives.

10. **Certification of Eligibility**

By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded government contracts by virtue of section 3 (a) of the Davis-Bacon Act or 29 CFR Sec. 5.12 (a) (1).

a. No part of this Contract shall be subcontracted to any person or firm ineligible for award of a government contract by virtue of section 3 (a) of the Davis-Bacon Act or 29 CFR Sec. 5.12(a) (1).

b. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S. C. Sec. 1001.

11. **Overtime Requirements**

No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to work in excess of eight hours in any calendar day or in excess of forty hours in such work week unless such laborer or mechanic receives compensation at a rate of pay for all hours worked in excess of eight hours, in any calendar day or in excess of forty hours in such work week, whichever is greater.

12. **Violation: Liability for Unpaid Wages: Liquidated Damages**

In the event of any violation of the clause set forth in subparagraph (b) (1) 29 CFR Sec. 5.5, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such district or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (b) (1) of 29 CFR Sec. 5.5 in the sum of $10 for each calendar day or which such individual was required or permitted to work in excess of eight hours or in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (b) (1) or 29 CFR Sec. 5.

13. **Withholding for Unpaid Wages and Liquidated Damages**

The Department of Transportation or the recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such contract or any other federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (b) (2) of 29 CFR Sec. 5.5.

14. **Nonconstruction Contracts**

In addition to the clauses contained in 29 CFR Sec. 5.5 (b) (10) through (14), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR Sec. 5.1., the recipient shall insert a clause requiring that the

Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the Contract for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain the names and address of each employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the recipient shall require the Contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Transportation and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during work hours on the job.

15. **Subcontracts**

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph 1 through 12 of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraph 1 through 14 of this paragraph.

16. **Certified Payroll - Construction Projects (11/7/77)**

The Authority shall obtain from each Contractor and subcontractor a certified copy of each weekly payroll within seven days after the regular payroll date. Following a review by the Authority for compliance with State and Federal Labor Laws, the payroll copy shall be retained at the project site for later review by the Federal Transportation Administration. A Contractor may use the Department of Labor Form WH-347, "Optional Payroll Form", which provides all the necessary payroll information and certifications. This Department of Labor Form may be purchased at nominal cost from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. However, the Contractor may use his own payroll form provided it includes the same information and certifications as the Department of Labor Form WH-348, "Statement of Compliance".

17. **Minority Business Enterprise Policy.** It is the policy of the Department of Transportation that minority business enterprises, as defined in 49 CFR Part 23, shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds under this agreement. Consequently, the MBE requirements of 49 CFR Part 23 apply to this agreement.

18. **MBE Obligation.** The Authority and its contractors agree to ensure that minority business enterprises as defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under this Agreement. In this regard the Authority and its contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that minority business enterprises have the maximum opportunity to compete for and perform contracts. The Authority and its contractors shall not discriminate on the basis of race, color, national origin or sex in the award and performance of DOT assisted contracts.

V. INTERESTS OF MEMBERS OF CONGRESS

Interest of Members of Congress. No Member of or delegate to the Congress of the United States shall be admitted to any share or part of this Project or to any benefit therefrom.

W. DEBARRED BIDDERS - DEBARMENT AND SUSPENSION

The Authority agrees to obtain certifications on debarment and suspension from its third party contractors and subcontractors and otherwise comply with U.S. DOT regulations, "Governmentwide Debarment and Suspension (Nonprocurement) and Governmentwide Requirements for Drug-Free Work place (Grants)," 49 C.F.R. Part 29.

1. Executive Order 12549 provides that, to the extent permitted by law, Executive departments and agencies shall participate in a Governmentwide system for nonprocurement debarment and suspension. A person who is debarred or suspended shall be excluded from Federal financial and non-financial assistance and benefits under Federal programs and activities. Debarment or suspension of a participant in a program by one agency shall have governmentwide effect.

2. These regulations implement section 3 of Executive Order 12549 and the guidelines promulgated by the Office of Management and Budget under section 6 of the Executive Order by:

   a. Prescribing the programs and activities that are covered by the governmentwide system;

   b. Prescribing the governmentwide criteria and governmentwide minimum due process procedures that each agency shall use;

   c. Providing for the listing of debarred and suspended participants declared ineligible and participants who have voluntarily excluded themselves from participation in covered transactions;

   d. Setting forth the consequences of a debarment, suspension, determination of ineligibility, or voluntary exclusion; and

   e. Offering such guidance as necessary for the effective implementation and administration of the governmentwide system.

3. Although these regulations cover the listing of ineligible participants and the effect of such listing, they do not prescribe policies and procedures governing declarations of ineligibility.

X. INSURANCE /BONDING - INSURANCE DURING CONSTRUCTION

At a minimum, the Contractor agrees to comply with the insurance requirements normally imposed by its State and local governments. ***[Refer to General Conditions, Supplementary Conditions and Contract Bond Forms]***

Y. PROJECT SIGNS

The Contractor agrees to cause to be erected at the site of construction, and maintained during construction, signs satisfactory to U.S. DOT identifying the Project and indicating that the Government is participating in the development of the Project. ***[Refer to Division 1, General Requirements]***

Z. CERTIFIED PAYROLL - CONSTRUCTION PROJECTS

The Authority shall obtain from each Contractor and subcontractor a certified copy of each weekly payroll within seven days after the regular payroll date. Following a review by the Authority for

compliance with State and Federal Labor Laws, the payroll copy shall be retained at the project site for later review by the Federal Transportation Administration. A Contractor may use the Department of Labor Form WH-347, "Optional Payroll form", which provides all the necessary payroll information and certifications. This Department of Labor Form may be purchased at nominal cost from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. However, the Contractor may use his own payroll form provided it includes the same information and certifications as the Department of Labor Form WH-348, "Statement of Compliance".

AA. MINORITY BUSINESS ENTERPRISE

Policy. It is the policy of the Department of Transportation that minority business enterprises, as defined in 49 CFR Part 23, shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds under this agreement. Consequently, the MBE requirements of 49 CFR Part 23 apply to this agreement.

BB. MBE OBLIGATION.

The Authority and its contractors agree to ensure that minority business enterprises as defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under this Agreement. In this regard the Authority and its contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that minority business enterprises have the maximum opportunity to compete for and perform contracts. The Authority and its contractors shall not discriminate on the basis of race, color, national origin or sex in the award and performance of DOT assisted contracts

CC. MINIMUM FEDERAL WAGE RATES

Minimum wages to be paid on this construction project have been established by Wage Predetermination Decisions of the U. S. Secretary of Labor. These wage rates must be prominently posted at the construction site.

1. Wage Determination Decision

   Wage predetermination decisions of the U. S. Secretary of Labor are incorporated herein as follows:

a. MA 030001 with Modification Nos. 0 through 4 for Suffolk County.

General Decision Number: MA030001 09/10/2004 MA1

Superseded General Decision Number: MA020001

State: Massachusetts

Construction Types: Building

Counties: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk and Suffolk Counties in Massachusetts.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	06/13/2003
1	03/19/2004
2	08/13/2004
3	08/20/2004
4	09/10/2004

ASBE0006-001 09/01/2003

BARNSTABLE (Except Barnstable, Bourne, Falmouth, Mashpee, Sandwich); BRISTOL (Easton); ESSEX; SUFFOLK; MIDDLESEX; AND NORFOLK (Except Bellingham, Franklin, Plainville, Wrentham) COUNTIES

	Rates	Fringes
Insulator/asbestos worker Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems.....	$ 33.04	12.81

ASBE0006-002 06/01/2004

BARNSTABLE (Except Barnstable, Bourne, Falmouth, Mashpee, Sandwich), ESSEX, MIDDLESEX, NORFOLK (Except Bellingham, Franklin, Plainville, Wrentham), AND SUFFOLK COUNTIES

	Rates	Fringes
Hazardous Material Handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems whether they contain asbestos or not)..	$ 20.05	9.40

ASBE0031-005 09/01/2003

BARNSTABLE (Townships of Barnstable, Bourne, Falmouth, Mashpee and Sandwich), BRISTOL (Except Easton) & NORFOLK (Bellingham, Franklin, Plainville & Wrentham) DUKES & NANTUCKET COUNTIES

	Rates	Fringes
Insulator/asbestos worker (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all tyes of mechanical systems)	$ 27.42	12.81

ASBE0201-001 07/01/2002

BARNSTABLE (Barnstable, Bourne, Falmouth, Mashpee, Sandwich); BRISTOL (Except Easton); DUKES, NANTUCKET, NORFOLK (Townships of Bellingham, Franklin, Plainville and Wrentham); PLYMOUTH (Townships of Lakeville, Mattapoisett, Middleboro, Rocherster and Wareham)

	Rates	Fringes
Hazardous Material Handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)..	$ 17.10	8.25

BOIL0029-001 10/01/2003

	Rates	Fringes
Boilermaker	$ 29.56	37%+5.34

BRMA0001-008 03/01/2004

FOXBOROCHAPTER
BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton) AND NORFOLK (Bellingham, Canton, Dedham, Foxboro, Franklin, Norfolk, Norwood, Plainville, Sharon, Walpole, Westrwood, Wrentham) COUNTIES

	Rates	Fringes
Bricklayer, Cement Mason, Plasterer	$ 34.34	16.17

BRMA0001-009 03/01/2004

LOWELL CHAPTER
MIDDLESEX (Acton, Asby, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstble, Ft. Denvens, Groton, Littleton, Lowell, North Acton, Pepperell, Shirley, South Acton, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington)

	Rates	Fringes
Bricklayer and plasterer	$ 34.34	16.17

BRMA0001-010 03/01/2004

LOWELL CHAPTER
MIDDLESEX (Ashland, Framingham, Holliston, Hopkinton, Hudson, Maynard, Natick, Sherborn, Stow); and NORFOLK (Medfield, Medway,Millis)

	Rates	Fringes
Bricklayer	$ 34.34	16.17

BRMA0003-001 06/01/2004

	Rates	Fringes
Marble & Tile Finisher	$ 27.39	15.35
Marble, Tile & Terrazzo Workers	$ 34.69	15.77
Terrazzo Finisher	$ 33.59	15.60

BRMA0003-003 08/01/2004

BOSTONCHAPTER
MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton); and SUFFOLK

	Rates	Fringes
Bricklayer	$ 35.55	17.04

BRMA0003-006 08/01/2004

LYNN CHAPTER
ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipsewich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield Wakefield, Wenham, West Newbury); and MIDDLESEX (Reading, North Reading, Wakefield)

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 35.45	17.14

BRMA0003-007 08/01/2004

WALTHAM CHAPTER
MIDDLESEX (Belmont, Burlington, Concord, Lexington, Lincoln, Stoneham, Sudbury, Waltham, Watertown, Wayland, Weston, Winchester, Woburn)

	Rates	Fringes
Bricklayer and plasterer	$ 34.15	18.44

BRMA0003-008 08/01/2004

NEWTONCHAPTER
MIDDLESEX (Newton) and NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 34.65	17.94

BRMA0003-009 08/01/2004

NEW BEDFORD
BARNSTABLE; BRISTOL (Acushnet, Darmouth, Farhaven, Fall River, Freetown, New Bedford, Somerset, Swansea, Westport); DUKES; and NANTUCKET COUNTIES

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 35.45	17.14

BRMA0003-010 08/01/2004

QUINCY CHAPTER
NORFOLK COUNTY (Avon, Braintree, Cohasset, Holbrook, Quincy, Randolph, Soughton, Weymouth)

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 34.15	18.44

CARP0026-001 04/01/2004

BRISTOL (Attleborough, North Attleborough); ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); AND NORFOLK (Bellingham, Canton, Foxboro, Franklin, Medfield, Medway, Millis, Needham, Norfolk, Norwood, Plainville, Sharon, Walpole, Wellesley, Westwood, Wrentham)

	Rates	Fringes
Carpenter	$ 24.76	16.41

CARP0033-001 04/01/2004

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); and SUFFOLK

	Rates	Fringes
Carpenter	$ 30.13	16.69

CARP0056-011 08/01/2003

SUFFOLK (All of County); and those areas of BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX & NORFOLK COUNTIES situated inside Boston Beltway (I-495) and North of Cape Cod Canal

	Rates	Fringes
Piledriverman	$ 29.88	13.45

CARP0056-012 08/01/2001

All of DUKES and NANTUCKET COUNTIES; and those areas of BARNSTABLE, BRISTOL, and NORFOLK COUNTIES situated OUTSIDE Boston Beltway (I-495) and South of Cape Cod Canal

	Rates	Fringes
Piledriverman	$ 24.11	13.45

CARP0056-013 08/01/2001

Those areas of ESSEX and MIDDLESEX COUNTIES situated OUTSIDE Boston Beltway (I-495)

	Rates	Fringes
Piledriverman	$ 24.90	13.45

CARP0424-003 04/01/2004

NORFOLK COUNTY (Braintree, Cohassett, Scituate, Weymouth, Quincy)

	Rates	Fringes
Carpenter	$ 24.76	16.41

CARP0624-005 04/01/2004

BARNSTABLE; BRISTOL (Except Attleboro & North Attleboro); DUKES; NANTUCKET; AND NORFOLK (Avon, Holbrook, Randolph, Stoughton) COUNTIES

	Rates	Fringes
Carpenter	$ 24.76	16.41

CARP1121-001 04/01/2001

	Rates	Fringes
Millwright	$ 25.08	13.16

CARP2168-001 04/01/2004

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); and SUFFOLK

	Rates	Fringes
Soft Floor Layer	$ 34.33	12.87

CARP2168-004 04/01/2004

BRISTOL; ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); Remainder of Norfolk County

	Rates	Fringes
Soft Floor Layer	$ 34.33	12.87

CARP2168-005 04/01/2004

BARNSTABALE; DUKES; AND NANTUCKET

	Rates	Fringes
Soft Floor Layer	$ 31.52	12.87

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* ELEC0096-001 06/01/2004

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend)

	Rates	Fringes
Electrician	$ 29.15	14.79
Teledata System Installer	$ 21.50	9.89

ELEC0099-001 06/01/2004

BRISTOL (Attleboro, North Attleboro, Seekonk)

	Rates	Fringes
Electrician	$ 30.47	42%
Teledata System Installer	$ 18.85	4.44+17%

ELEC0103-001 06/01/2003

ESSEX; MIDDLESEX (Excluding Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend); NORFOLK (Excluding Avon, Holbrook, Plainville, Randolph, Stoughton) SUFFOLK

	Rates	Fringes
Teledata System Installer	$ 25.30	14.04

ELEC0103-002 09/01/2003

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX (Bedford, Billerica, Boxboro, Burlington, Carlisle, Chelmsford, Dracut, Dunstable littleton, Lowell, North Reading, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
Electrician	$ 35.40	16.20

ELEC0103-004 09/01/2003

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Manchester, Marblehead, Middleton, Peabody, Rockport, Salem, Topsfield, Wenham)

	Rates	Fringes
Electrician	$ 35.40	16.20

ELEC0103-005 09/01/2003

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Belmont, Cambridge, Concord, Everett, Framingham, Holliston, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Frankloin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham and Hull);SUFFOLK

	Rates	Fringes
Electrician	$ 35.40	16.20

ELEC0104-001 08/31/2003

	Rates	Fringes
Line Construction:		
Cableman and Technician	$ 25.59	6.70+6%+A
Cableman	$ 26.79	8.45+6%+A
Equipment Operator	$ 26.79	8.45+6%+A
Groundman	$ 17.34	6.95+6%+A
Groundsman	$ 16.56	4.20+6%+A
Lineman	$ 31.52	9.20+6%+A

A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day and Columbus Day, provided the employee has been employed 5 working days prior to any one of the listed holidays.

ELEC0223-005 03/01/2004

BARNSTABLE; BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET AND NORFOLK (Avon, Halbrook, Plainville, Randolph, Stoughton)

	Rates	Fringes
Electrician	$ 29.97	12.75

ELEC0223-006 03/01/2004

BARNSTABLE; BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET AND NORFOLK (Avon, Halbrook, Plainville, Randolph, Stoughton)

	Rates	Fringes
Teledata System Installer	$ 23.39	10.19

ELEV0004-001 01/01/2004

	Rates	Fringes
Elevator Mechanic	$ 39.395	10.765+A

FOOTNOTEFORELEVATOR MECHANICS:
A. Employer Contributes 8% of basic hourly rate for 5 years or more of service and 6% for 6 months to 5 years of service as vacation pay. Six paid holidays (provided employee has worked 5 consecutive days before and the working day after the holiday): New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

ENGI0004-001 06/01/2004

	Rates	Fringes
Power equipment operators:		
Group 1	$ 32.68	14.08+A
Group 2	$ 32.44	14.08+A
Group 3	$ 25.00	14.08+A
Group 4	$ 28.51	14.08+A
Group 5	$ 20.57	14.08+A
Group 6	$ 22.72	14.08+A

FOOTNOTEFORPOWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

HOURLY PREMIUM FOR BOOM LENGTHS (Including Jib):

Over 150 ft.	+1.59
Over 185 ft.	+2.79
Over 210 ft.	+3.92
Over 250 ft.	+5.95
Over 295 ft.	+8.23
Over 350 ft.	+9.59

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

Group 1: Crane; shovel; truck crane; cherry picker; dragline; trench hoe; backhoe; three drum machine; derrick; pile driver; elevator tower; hoist; gradall; shovel dozer; front end loader; fork lift; suger; boring machine; rotaryu drill; post hole hammer; post hole digger; pumpcrete machine; asphalt plant (on site); concrete batching and/or mixing plant (on site); crusher plant (on site); paving concrete mixer; timber jack

Group 2: Sonic or vibratory hammer; grader; scraper; tandem scraper; concrete pump; bulldozer; tractor; york rake; mulching machine; portable steam boiler; portable steam generator; roller; spreader; tamper (self propelled or tractor drawn); asphalt paver; mechanic - maintenance; paving screed machine; stationary steam boiler; paving concrete finishing machine; cal truck; ballast regulator; switch tamper; rail anchor machine; tire truck

Group 3: Pumps (1-3 grouped); compressor; welding machine (1-3 grouped); generator; concrete vibrator; heater (power driven 1- 5); well point system (operating); syphon-pulsometer; concrete mixer; valves controlling permanent plant air or steam; conveyor; Jackson type tamper; single diaphragm pump; lighting plant

Group 4: Assistant engineer (fireman)

Group 5: Oiler (other than truck cranes and gradalls)

Group 6: Oiler (on truck cranes and gradalls) stant engineer (on truck crane and gradall)

IRON0007-006 03/16/2003

	Rates	Fringes
Ironworkers:		
BRISTOL (Easton); ESSEX (Beverly Gloucester, Lynn,Lynnfield, Manchester, Marblehead Nahant, Salem, Saugus, Swampscott); MIDDLESEX (Arlington, Bedford, Belmont, Burlington, Cambridge, Concord, Everett, Framingham, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Except Medway); SUFFOLK.....	$ 28.25	16.25
ESSEX (Amesbury, Andover, Boxford, Danvers, Essex, Gerogetown, Hamilton, Haverhill, Ipswich, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rockport, Rowley, Salisbury, Topsfield, Wenham, West Newbury); MIDDLESEX (Action, Billericia, Carlisle, Chelmsford, Dracut, Dunstable, Groton, Groveland, Littleton, Lowell, Middleton, North Reading, Pepperell, Tewksbury, Tyngsboro, Westford, Wilminton).....	$ 23.84	16.25

IRON0037-005 06/01/2003

BARNSTABLE; BRISTOL (Acushnet, Attleboro, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Mansfield, New Bedford, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton, Westport); DUKES; NANTUCKET; NORFOLK (Billingham, Franklin, Plainville, Wrentham)

	Rates	Fringes
Ironworker	$ 27.10	13.38

IRON0057-001 05/01/2004

MIDDLESEX (Ashby, Ashland, Ayer, Boxboro, Holliston, Hopkinton, Hudson, Marlboro, Shirley, Stow, Townsend); NORFOLK (Medway)

	Rates	Fringes
Ironworker	$ 30.17	15.98

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* LABO0014-001 06/01/2004

	Rates	Fringes
Plasterer tender		
BARNSTABLE, BRISTOL, DUKES, ESSEX, NANTUCKET, MIDDLESEX (with the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn); NORFOLK (with the exception of Brookline Dedham and Milton) COUNTIES.	$ 21.60	11.10
SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer Island, Nut Island); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)....	$ 22.90	13.15

LABO0022-00906/01/2003

SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer & Nut Islands); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop, and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)

	Rates	Fringes
Laborers:		
Group 1	$ 22.50	11.30
Group 2	$ 22.75	11.30
Group 3	$ 23.25	11.30
Group 4	$ 23.50	11.30
Group 5	$ 23.25	11.30
Group 6	$ 24.50	11.30
Group 7	$ 16.60	11.30

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; Carpenter Tenders

GROUP 2: Jackhammer operator; pavement breaker; asphalt raker carbide core drilling machine; chain saw operator; pipelayer; barco type jumping tampers; laser beam; concrete pump; mason tender; motorized mortar mixer; ride-on motorized buggy; fence and beam rail erector

GROUP 3: Air track, block paver; rammer; curb setter, hydraulic and similar self-powered drills

GROUP 4: Blaster; powderman

GROUP 5: Pre-cast floor and roof plank erector

GROUP 6: Asbestos removal laborers/haz-mat laborers

GROUP 7: Flaggers

LABO0022-01006/01/2003

Counties of BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; MIDDLESEX (with the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakfield, Winchester, Winthrop and Woburn); NORFOLK (with the exception of Brookline, Dedham and Milton)

	Rates	Fringes
Laborers:		
Group 1	$ 20.85	9.80
Group 2	$ 21.10	9.80
Group 3	$ 21.60	9.80
Group 4	$ 21.85	9.80
Group 5	$ 21.60	9.80
Group 6	$ 22.85	9.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; Carpenter Tenders

GROUP 2: Jackhammer operator; pavement breaker; asphalt raker carbide core drilling machine; chain saw operator; pipelayer; barco type jumping tampers; laser beam; concrete pump; mason tender; motorized mortar mixer; ride-on motorized buggy; fence and beam rail erector

GROUP 3: Air track, block paver; hammer; curb setter, hydraulic and similar self-powered drills

GROUP 4: Blaster; powderman

GROUP 5: Pre-cast floor and roof plank erector

GROUP 6: Asbestos removal laborers/haz-mat laborers

LABO1421-00406/01/2003

BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET NORFOLK AND SUFFOLK COUNTIES

	Rates	Fringes
Laborers:		
WRECKING LABORERS:		
Adzeman	$ 22.60	11.30
Asbestos, Toxic Hazardous waste and lead paint removers	$ 24.60	11.30
Burners, Jackhammers	$ 22.85	11.30
Small Backhoes, Loaders		

on Tract, and Bobcat type
loaders.....$ 23.10 11.30
Wrecking Laborers.....$ 22.60 11.30
Yardmen Burners, Sawyers...$ 21.70 11.30
Yardmen Laborer (Salvage
Yard only).....$ 18.60 11.30

PAIN0011-007 06/01/2004

BARNSTABLE, BRISTOL, DUKES, AND NANTUCKET COUNTIES

	Rates	Fringes
Glazier	$ 27.48	11.00+A

FOOTNOTE:
A. PAID HOLIDAY: LABOR DAY (provided employee has worked any part of the week prior to Labor Day and any part of the week after Labor Day)

PAIN0035-004 07/01/2004

BARNSTABLE; BRISTOL; ESSEX; NANTUCKET; DUKES; COUNTIES; REMAINDER OF NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES

	Rates	Fringes
Painters:		
NEW CONSTRUCTION:		
Brush, Taper	$ 25.71	15.36
Spray, Sandblast	$ 26.71	15.36
REPAINT:		
Brush, Taper	$ 23.77	15.36
Spray, Sandblast	$ 24.77	15.36

PAIN0035-013 07/01/2004

MIDDLESEX (Cambridge, Everett, Malden, Medford, Somerville)
SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)

	Rates	Fringes
Painters:		
NEW CONSTRUCTION;		
Brush, Taper	$ 31.50	15.36
Spray, Sandblast	$ 32.50	15.36
REPAINT;		
Brush, Taper	$ 29.56	15.36
Spray, Sandblast	$ 30.56	15.36

PAIN0035-020 07/01/2004

ESSEX; MIDDLESEX; NORFOLK; SUFFOLK

	Rates	Fringes
Glazier	$ 25.71	15.36

PLAS0534-001 07/01/2004

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, North Andover, Salisbury, West Newbury); MIDDLESEX (Acton, Arlington, Bedford, Billerica, Burlington, Cambridge,Carlisle, Chemsford, Dracut, Dunstable, Everett, Littleton, Lowell, Malden, Medford, Melrose, Reading, North Reading, Stoneham, Tewksbury, Tyngsboro, Wakefield, Westford, Wilmington, Winchester & Woburn); AND NORFOLK (Brookline, Milton)SUFFOLK COUNTY

	Rates	Fringes
Cement Mason	$ 30.60	19.53

PLAS0534-004 07/01/2004

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton): and SUFFOLK

	Rates	Fringes
Plasterer	$ 30.60	19.53

PLUM0004-001 03/01/2004

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston and Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)

	Rates	Fringes
Plumbers and Pipefitters	$ 31.84	12.43

PLUM0012-005 03/01/2004

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Ashland, Ayer - except W. of Greenville Branch of Boston & Maine RR, Bedford, Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlisle, Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham, Hudson, Holliston, Hopkinton, Lexington, Lincoln, Littleton, Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick, Newton, North Reading, Pepperell, Reading, Sherborn, Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro, Wakefield, Waltham, Watertown, Wayland, Westford, Wilmington, Winchester, Woburn);

NORFOLK (Bellingham, Braintree, Brokline, Canton, Cohasset, Dedham, Dover,Foxboro, Franklin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); AND SUFFOLK COUNTIES

	Rates	Fringes
Plumber	$ 36.72	15.23

PLUM0051-004 09/01/2004

BARNSTABLE; BRISTOL; DUKES; NANTUCKET; AND NORFOLK (Avon, Holbro Randolph, Stoughton) COUNTIES

	Rates	Fringes
Plumbers and Pipefitters	$ 31.16	15.41

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* PLUM0138-001 03/01/2003

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Manchester, Marblehead, Merrimac, Methuen, Middleton, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West Newbury)

	Rates	Fringes
Plumber, Pipefitter, Steamfitter	$ 29.92	13.19

PLUM0537-003 09/01/2003

MIDDLESEX (Arlington, Cambridge, Everett, Lincoln, Malden, Medford, Melrose, Reading, Wakefield, Winchester and Woburn), NORFOLK (Bellingham, Braintree, Brookline, Canton, Cashasset, (Bellingham, Braintree, Brookline, Canton Cashasset, Dedham, Foxboro, Franklin, Millis, Milton, Sharon, Walpole, Westwood, and Wrenthan) ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swanpscott) SUFFOLK (Boston and Chelsea)

	Rates	Fringes
Pipefitter	$ 36.86	13.79

ROOF0033-00102/01/2000

	Rates	Fringes
Roofers:		
All Tear-off and/or removal of any types of roofing , and all spudding, sweeping, vacuuming and/or cleanup of any and all areas of any type where a roof is to be relaid	$ 27.36	12.75
All Tear-off and/or removal of any types of roofing, and all spudding, sweeping, vacuuming and/or cleanup of any and all areas of any type where a roof is to be relaid	$ 23.46	11.15

SFMA0550-001 01/01/2004

BRISTOL (Portion within 35 mile radius from Boston City Hall; ESSEX; MIDDLESEX (Except Ashby, Townsend, and portions of Pepperell and Shirley beyond 35 mile radius from Boston City Hall); NORFOLK; PLYMOUTH (Portion within 35 mile radius of Boston City Hall); SUFFOLK

	Rates	Fringes
Sprinkler Fitter	$ 39.60	12.36

SFMA0669-001 01/01/2004

BARNSTABLE; BRISTOL (Beyond 35 mile radius of Boston City Hall); DUKES; MIDDLESEX (Ashby, Townsend, portions of Pepperell and Shirley beyond 35 mile radius of Boston City Hall); NANTUCKET; PLYMOUTH (Beyond 35 mile radius of Boston City Hall)

	Rates	Fringes
Sprinkler Fitter	$ 26.03	10.95

SFMA0676-001 08/01/2003

BRISTOL (Seekonk, Swansea, and Somerset)

	Rates	Fringes
Sprinkler Fitter	$ 31.00	11.90

SHEE0017-003 08/01/2004

BRISTOL (Attleboro, Berkley, Easton, Mansfield, North Attleboro, Norton, Raynham, Taunton); ESSEX; MIDDLESEX; NORFOLK; PLYMOUTH (except except Marion, Mattapoisett, Rochester, Wareham); SUFFOLK

	Rates	Fringes
Sheet metal worker	$ 33.79	19.88

SHEE0017-007 07/01/2004

BARNSTABLE; BRISTOL (Acushnet, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Rehoboth, Seeekonk, Somerset, Swansea, Westport, New Bedford); DUKES; AND NANTUCKET

	Rates	Fringes
Sheet metal worker	$ 29.87	17.34

TEAM0379-001 12/01/2003

	Rates	Fringes
Truck drivers:		
Group 1	$ 25.13	9.61+A+B
Group 2	$ 25.30	9.61+A+B
Group 3	$ 25.37	9.61+A+B
Group 4	$ 25.49	9.61+A+B
Group 5	$ 25.59	9.61+A+B
Group 6	$ 25.88	9.61+A+B
Group 7	$ 26.17	9.61+A+B

POWER TRUCKS $.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE
HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM

TRUCK DRIVERS CLASSIFICATIONS

Group 1: Station wagons; panel trucks; and pickup trucks

Group 2: Two axle equipment; & forklift operator

Group 3: Three axle equipment and tireman

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons other than conventional type trucks; low bed; vachual; mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

B. PAID VACATION: Employees with 4 months to 1 year of service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10 years of service

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.)

and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

DD. EQUAL EMPLOYMENT OPPORTUNITY (EEO)

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER NO. 11246):

1. AS USED IN THESE SPECIFICATIONS:

   a. "COVERED AREA" MEANS THE GEOGRAPHICAL AREA DESCRIBED IN THE SOLICITATION FROM WHICH THIS CONTRACT RESULTED;

   b. "DIRECTOR" MEANS DIRECTOR, OFFICE OF FEDERAL CONTRACT COMPLIANCE PROGRAMS, UNITED STATES DEPARTMENT OF LABOR, OR ANY PERSON TO WHOM THE DIRECTOR DELEGATES AUTHORITY;

   c. "EMPLOYER IDENTIFICATION NUMBER" MEANS THE FEDERAL SOCIAL SECURITY NUMBER USED ON THE EMPLOYER'S QUARTERLY FEDERAL TAX RETURN, U.S. TREASURY DEPARTMENT FORM 941;

   d. "MINORITY" INCLUDES:

      (i) BLACK (ALL PERSONS HAVING ORIGINS IN ANY OF THE BLACK AFRICAN RACIAL GROUPS NOT OF HISPANIC ORIGIN);

      (ii) HISPANIC (ALL PERSONS OF MEXICAN, PUERTO RICAN, CUBAN, CENTRAL OR SOUTH AMERICAN, OR OTHER SPANISH CULTURE OR ORIGIN, REGARDLESS OF RACE);

      (iii) ASIAN AND PACIFIC ISLANDER (ALL PERSONS HAVING ORIGINS IN ANY OF THE ORIGINAL PEOPLES OF THE FAR EAST, SOUTHEAST ASIA, THE INDIAN SUBCONTINENT, OR THE PACIFIC ISLANDS); AND

      (iv) AMERICAN INDIAN OR ALASKAN NATIVE (ALL PERSONS HAVING ORIGINS IN ANY OF THE ORIGINAL PEOPLES OF NORTH AMERICA AND MAINTAINING IDENTIFIABLE TRIBAL AFFILIATIONS THROUGH MEMBERSHIP AND PARTICIPATION OR COMMUNITY IDENTIFICATION).

2. WHENEVER THE CONTRACTOR, OR SUBCONTRACTOR AT ANY TIER, SUBCONTRACTS A PORTION OF THE WORK INVOLVING ANY CONSTRUCTION TRADE, IT SHALL PHYSICALLY INCLUDE IN EACH SUBCONTRACT IN EXCESS OF $10,000 THE PROVISIONS OF THESE SPECIFICATIONS AND THE NOTICE WHICH CONTAINS THE APPLICABLE GOALS FOR MINORITY AND FEMALE PARTICIPATION AND WHICH IS SET FORTH IN THE SOLICITATIONS FROM WHICH THIS CONTRACT RESULTED.

3. IF THE CONTRACTOR IS PARTICIPATING (PURSUANT TO 41 C.F.R. § 60-4.5) IN A HOMETOWN PLAN APPROVED BY THE U. S. DEPARTMENT OF LABOR IN THE COVERED AREA, EITHER INDIVIDUALLY OR THROUGH AN ASSOCIATION, ITS AFFIRMATIVE ACTION OBLIGATIONS ON ALL WORK IN THE PLAN AREA (INCLUDING GOALS AND TIMETABLES) SHALL BE IN ACCORDANCE WITH THAT PLAN FOR THOSE TRADES WHICH HAVE UNIONS PARTICIPATING IN THE PLAN. CONTRACTORS MUST BE ABLE TO DEMONSTRATE THEIR PARTICIPATION IN AND COMPLIANCE WITH THE PROVISIONS OF ANY SUCH HOMETOWN PLAN. EACH CONTRACTOR OR SUBCONTRACTOR PARTICIPATING IN AN APPROVED PLAN IS INDIVIDUALLY REQUIRED TO COMPLY WITH ITS OBLIGATIONS UNDER THE EEO CLAUSE, AND TO MAKE A GOOD FAITH EFFORT TO ACHIEVE EACH GOAL UNDER THE PLAN IN EACH

TRADE IN WHICH IT HAS EMPLOYEES. THE OVERALL GOOD FAITH PERFORMANCE BY OTHER CONTRACTORS OR SUBCONTRACTORS TOWARD A GOAL IN AN APPROVED PLAN DOES NOT EXCUSE ANY COVERED CONTRACTOR'S OR SUBCONTRACTOR'S FAILURE TO MAKE GOOD FAITH EFFORTS TO ACHIEVE THE PLAN GOALS AND TIMETABLES.

4. THE CONTRACTOR SHALL IMPLEMENT THE SPECIFIC AFFIRMATIVE ACTION STANDARDS PROVIDED IN PARAGRAPHS (7)(a) THROUGH (p) OF THESE SPECIFICATIONS. THE GOALS SET FORTH IN THE SOLICITATION FROM WHICH THIS CONTRACT RESULTED ARE EXPRESSED AS PERCENTAGES OF THE TOTAL HOURS OF EMPLOYMENT AND TRAINING OF MINORITY AND FEMALE UTILIZATION THE CONTRACTOR SHOULD REASONABLY BE ABLE TO ACHIEVE IN EACH CONSTRUCTION TRADE IN WHICH IT HAS EMPLOYEES IN THE COVERED AREA. COVERED CONSTRUCTION CONTRACTORS PERFORMING CONSTRUCTION WORK IN GEOGRAPHICAL AREAS WHERE THEY DO NOT HAVE A FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION CONTRACT SHALL APPLY THE MINORITY AND FEMALE GOALS ESTABLISHED FOR THE GEOGRAPHICAL AREA WHERE THE WORK IS BEING PERFORMED. GOALS ARE PUBLISHED PERIODICALLY IN THE FEDERAL REGISTER IN NOTICE FORM, AND SUCH NOTICES MAY BE OBTAINED FROM ANY OFFICE OF FEDERAL CONTRACT COMPLIANCE PROGRAMS OFFICE OR FROM FEDERAL PROCUREMENT CONTRACTING OFFICERS. THE CONTRACTOR IS EXPECTED TO MAKE SUBSTANTIALLY UNIFORM PROGRESS TOWARD ITS GOAL IN EACH CRAFT DURING THE PERIOD SPECIFIED.

5. NEITHER THE PROVISIONS OF ANY COLLECTIVE BARGAINING AGREEMENT, NOR THE FAILURE BY A UNION WITH WHOM THE CONTRACTOR HAS A COLLECTIVE BARGAINING AGREEMENT TO REFER EITHER MINORITIES OR WOMEN SHALL EXCUSE THE CONTRACTOR'S OBLIGATIONS UNDER THESE SPECIFICATIONS, EXECUTIVE ORDER NO. 11246, OR THE REGULATIONS PROMULGATED PURSUANT THERETO.

6. IN ORDER FOR THE NONWORKING TRAINING HOURS OF APPRENTICES AND TRAINEES TO BE COUNTED IN MEETING THE GOALS, SUCH APPRENTICES AND TRAINEES MUST BE EMPLOYED BY THE CONTRACTOR DURING THE TRAINING PERIOD, AND THE CONTRACTOR MUST HAVE MADE A COMMITMENT TO EMPLOY THE APPRENTICES AND TRAINEES AT THE COMPLETION OF THEIR TRAINING, SUBJECT TO THE AVAILABILITY OF EMPLOYMENT OPPORTUNITIES. TRAINEES MUST BE TRAINED PURSUANT TO TRAINING PROGRAMS APPROVED BY THE U.S. DEPARTMENT OF LABOR.

7. THE CONTRACTOR SHALL TAKE SPECIFIC AFFIRMATIVE ACTIONS TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY. THE EVALUATION OF THE CONTRACTOR'S COMPLIANCE WITH THESE SPECIFICATIONS SHALL BE BASED UPON ITS EFFORT TO ACHIEVE MAXIMUM RESULTS FROM ITS ACTIONS. THE CONTRACTOR SHALL DOCUMENT THESE EFFORTS FULLY, AND SHALL IMPLEMENT AFFIRMATIVE ACTION STEPS AT LEAST AS EXTENSIVE AS THE FOLLOWING:

   a. ENSURE AND MAINTAIN A WORKING ENVIRONMENT FREE OF HARASSMENT, INTIMIDATION, AND COERCION AT ALL SITES, AND IN ALL FACILITIES AT WHICH THE CONTRACTOR'S EMPLOYEES ARE ASSIGNED TO WORK. THE CONTRACTOR, WHERE POSSIBLE, WILL ASSIGN TWO OR MORE WOMEN TO EACH CONSTRUCTION PROJECT. THE CONTRACTOR SHALL SPECIFICALLY ENSURE THAT ALL FOREMEN, SUPERINTENDENTS, AND OTHER ON-SITE SUPERVISORY PERSONNEL ARE AWARE OF AND CARRY OUT THE CONTRACTOR'S OBLIGATION TO MAINTAIN SUCH A WORKING ENVIRONMENT, WITH SPECIFIC ATTENTION TO

MINORITY OR FEMALE INDIVIDUALS WORKING AT SUCH SITES OR IN SUCH FACILITIES.

b. ESTABLISH AND MAINTAIN A CURRENT LIST OF MINORITY AND FEMALE RECRUITMENT SOURCES, PROVIDE WRITTEN NOTICE TO MINORITY AND FEMALE RECRUITMENT SOURCES AND TO COMMUNITY ORGANIZATIONS WHEN THE CONTRACTOR OR ITS UNIONS HAVE EMPLOYMENT OPPORTUNITIES AVAILABLE, AND MAINTAIN A RECORD OF THE ORGANIZATIONS' RESPONSES.

c. MAINTAIN A CURRENT FILE OF THE NAMES, ADDRESSES, AND TELEPHONE NUMBERS OF EACH MINORITY AND FEMALE OFF-THE-STREET APPLICANT AND MINORITY OR FEMALE REFERRAL FROM A UNION, A RECRUITMENT SOURCE OR COMMUNITY ORGANIZATION AND OF WHAT ACTION WAS TAKEN WITH RESPECT TO EACH SUCH INDIVIDUAL. IF SUCH INDIVIDUAL WAS SENT TO THE UNION HIRING HALL FOR REFERRAL AND WAS NOT REFERRED BACK TO THE CONTRACTOR BY THE UNION OR, IF REFERRED, NOT EMPLOYED BY THE CONTRACTOR, THIS SHALL BE DOCUMENTED IN THE FILE WITH THE REASON THEREFOR, ALONG WITH WHATEVER ADDITIONAL ACTIONS THE CONTRACTOR MAY HAVE TAKEN.

d. PROVIDE IMMEDIATE WRITTEN NOTIFICATION TO THE DIRECTOR WHEN THE UNION OR UNIONS WITH WHICH THE CONTRACTOR HAS A COLLECTIVE BARGAINING AGREEMENT HAS NOT REFERRED TO THE CONTRACTOR A MINORITY PERSON OR WOMAN SENT BY THE CONTRACTOR, OR WHEN THE CONTRACTOR HAS OTHER INFORMATION THAT THE UNION REFERRAL PROCESS HAS IMPEDED THE CONTRACTOR'S EFFORT'S TO MEET ITS OBLIGATIONS.

e. DEVELOP ON-THE-JOB OPPORTUNITIES AND/OR PARTICIPATE IN TRAINING PROGRAMS FOR THE AREA WHICH EXPRESSLY INCLUDE MINORITIES AND WOMEN, INCLUDING UPGRADING PROGRAMS AND APPRENTICESHIP AND TRAINEE PROGRAMS RELEVANT TO THE CONTRACTOR'S EMPLOYMENT NEEDS, ESPECIALLY THOSE PROGRAMS FUNDED OR APPROVED BY THE DEPARTMENT OF LABOR. THE CONTRACTOR SHALL PROVIDE NOTICE OF THESE PROGRAMS TO THE SOURCES COMPILED UNDER (7)(b) ABOVE.

f. DISSEMINATE THE CONTRACTOR'S EEO POLICY BY PROVIDING NOTICE OF THE POLICY TO UNIONS AND TRAINING PROGRAMS AND REQUESTING THEIR COOPERATION IN ASSISTING THE CONTRACTOR IN MEETING ITS EEO OBLIGATIONS; BY INCLUDING IT IN ANY POLICY MANUAL AND COLLECTIVE BARGAINING AGREEMENT; BY PUBLICIZING IT IN THE COMPANY NEWSPAPER, ANNUAL REPORT, ETC.; BY SPECIFIC REVIEW OF THE POLICY WITH ALL MANAGEMENT PERSONNEL AND WITH ALL MINORITY AND FEMALE EMPLOYEES AT LEAST ONCE A YEAR; AND BY POSTING THE COMPANY EEO POLICY ON BULLETIN BOARDS ACCESSIBLE TO ALL EMPLOYEES AT EACH LOCATION WHERE CONSTRUCTION WORK IS PERFORMED.

g. REVIEW, AT LEAST ANNUALLY, THE COMPANY'S EEO POLICY AND AFFIRMATIVE ACTION OBLIGATIONS UNDER THESE SPECIFICATIONS WITH ALL EMPLOYEES HAVING RESPONSIBILITY FOR HIRING, ASSIGNMENT, LAYOFF, TERMINATION OR OTHER EMPLOYMENT DECISIONS INCLUDING SPECIFIC REVIEW OF THESE ITEMS WITH ON-SITE SUPERVISORY PERSONNEL SUCH AS SUPERINTENDENTS, GENERAL FOREMAN, ETC., PRIOR TO THE INITIATION OF CONSTRUCTION WORK AT ANY JOB SITE. A WRITTEN RECORD SHALL BE MADE AND MAINTAINED IDENTIFYING THE TIME AND PLACE OF THESE MEETINGS, PERSONS ATTENDING, SUBJECT MATTER DISCUSSED, AND DISPOSITION OF THE SUBJECT MATTER.

h. DISSEMINATE THE CONTRACTOR'S EEO POLICY EXTERNALLY BY INCLUDING IT IN ANY ADVERTISING IN THE NEWS MEDIA, SPECIFICALLY INCLUDING MINORITY AND FEMALE NEWS MEDIA, AND PROVIDING WRITTEN NOTIFICATION TO AND DISCUSSING THE CONTRACTOR'S EEO POLICY WITH OTHER CONTRACTORS AND SUBCONTRACTORS WITH WHOM THE CONTRACTOR DOES OR ANTICIPATES DOING BUSINESS.

I. DIRECT RECRUITMENT EFFORTS, BOTH ORAL AND WRITTEN, TO MINORITY, FEMALE, AND COMMUNITY ORGANIZATIONS, TO SCHOOLS WITH MINORITY AND FEMALE STUDENTS AND TO MINORITY AND FEMALE RECRUITMENT AND TRAINING ORGANIZATIONS SERVING THE CONTRACTOR'S RECRUITMENT AREA AND EMPLOYMENT NEEDS. NOT LATER THAN ONE MONTH PRIOR TO THE DATE FOR THE ACCEPTANCE OF APPLICATIONS FOR APPRENTICESHIP OR OTHER TRAINING BY ANY RECRUITMENT SOURCE, THE CONTRACTOR SHALL SEND WRITTEN NOTICE TO ORGANIZATIONS SUCH AS THE ABOVE, DESCRIBING THE OPENINGS, SCREENING PROCEDURES, AND TESTS TO BE USED IN THE SELECTION PROCESS.

j. ENCOURAGE PRESENT MINORITY AND FEMALE EMPLOYEES TO RECRUIT OTHER MINORITY PERSONS AND WOMEN AND, WHERE REASONABLE, PROVIDE AFTER SCHOOL, SUMMER AND VACATION EMPLOYMENT TO MINORITY AND FEMALE YOUTH BOTH ON THE SITE AND IN OTHER AREAS OF THE CONTRACTOR'S WORK FORCE.

k. VALIDATE ALL TESTS AND OTHER SELECTION REQUIREMENTS WHERE THERE IS AN OBLIGATION TO DO SO UNDER 41 C.F.R. PART 60-3.

l. CONDUCT, AT LEAST ANNUALLY, AN INVENTORY AND EVALUATION AT LEAST OF ALL MINORITY AND FEMALE PERSONNEL FOR PROMOTIONAL OPPORTUNITIES AND ENCOURAGE THESE EMPLOYEES TO SEEK OR PREPARE FOR, THROUGH APPROPRIATE TRAINING, ETC., SUCH OPPORTUNITIES.

m. ENSURE THAT SENIORITY PRACTICES, JOB CLASSIFICATIONS, WORK ASSIGNMENTS, AND OTHER PERSONNEL PRACTICES DO NOT HAVE A DISCRIMINATORY EFFECT BY CONTINUALLY MONITORING ALL PERSONNEL AND EMPLOYMENT RELATED ACTIVITIES TO ENSURE THAT THE EEO POLICY AND THE CONTRACTOR'S OBLIGATIONS UNDER THESE SPECIFICATIONS ARE BEING CARRIED OUT.

n. ENSURE THAT ALL FACILITIES AND COMPANY ACTIVITIES ARE NONSEGREGATED EXCEPT THAT SEPARATE OR SINGLE-USER TOILET AND NECESSARY CHANGING FACILITIES SHALL BE PROVIDED TO ASSURE PRIVACY BETWEEN SEXES.

o. DOCUMENT AND MAINTAIN A RECORD OF ALL SOLICITATIONS OF OFFERS FOR SUBCONTRACTS FROM MINORITY AND FEMALE CONSTRUCTION CONTRACTORS AND SUPPLIERS, INCLUDING CIRCULATION OF SOLICITATIONS TO MINORITY AND FEMALE CONTRACTOR ASSOCIATIONS AND OTHER BUSINESS ASSOCIATIONS.

p. CONDUCT A REVIEW, AT LEAST ANNUALLY, OF ALL SUPERVISORS' ADHERENCE TO AND PERFORMANCE UNDER THE CONTRACTOR'S EEO POLICIES AND AFFIRMATIVE ACTION OBLIGATIONS.

8. CONTRACTORS ARE ENCOURAGED TO PARTICIPATE IN VOLUNTARY ASSOCIATIONS THAT ASSIST IN FULFILLING ONE OR MORE OF THEIR AFFIRMATIVE ACTION

OBLIGATIONS SET FORTH IN PARAGRAPHS (7)(a) THROUGH (p). THE EFFORTS OF A CONTRACTOR ASSOCIATION, JOINT CONTRACTOR-UNION, CONTRACTOR-COMMUNITY, OR OTHER SIMILAR GROUP OF WHICH THE CONTRACTOR IS A MEMBER AND PARTICIPANT, MAY BE ASSERTED AS FULFILLING ANY ONE OR MORE OF ITS OBLIGATIONS UNDER PARAGRAPHS (7)(a) THROUGH (p) OF THESE SPECIFICATIONS, PROVIDED THAT THE CONTRACTOR ACTIVELY PARTICIPATES IN THE GROUP, MAKES EVERY EFFORT TO ASSURE THAT THE GROUP HAS A POSITIVE IMPACT ON THE EMPLOYMENT OF MINORITIES AND WOMEN IN THE INDUSTRY, ENSURES THAT THE CONCRETE BENEFITS OF THE PROGRAM ARE REFLECTED IN THE CONTRACTOR'S MINORITY AND FEMALE WORK FORCE PARTICIPATION, MAKES A GOOD FAITH EFFORT TO MEET ITS INDIVIDUAL GOALS AND TIMETABLES, AND CAN PROVIDE ACCESS TO DOCUMENTATION THAT DEMONSTRATES THE EFFECTIVENESS OF ACTIONS TAKEN ON BEHALF OF THE CONTRACTOR. THE OBLIGATION TO COMPLY, HOWEVER, IS THE CONTRACTOR'S AND FAILURE OF SUCH A GROUP TO FULFILL AN OBLIGATION SHALL NOT BE A DEFENSE FOR THE CONTRACTOR'S NONCOMPLIANCE.

9. A SINGLE GOAL FOR MINORITIES AND A SEPARATE SINGLE GOAL FOR WOMEN HAVE BEEN ESTABLISHED. THE CONTRACTOR, HOWEVER, IS REQUIRED TO PROVIDE EQUAL EMPLOYMENT OPPORTUNITY AND TO TAKE AFFIRMATIVE ACTION FOR ALL MINORITY GROUPS, BOTH MALE AND FEMALE, AND ALL WOMEN, BOTH MINORITY AND NON-MINORITY. CONSEQUENTLY, THE CONTRACTOR MAY BE IN VIOLATION OF THE EXECUTIVE ORDER IF A PARTICULAR GROUP IS EMPLOYED IN A SUBSTANTIALLY DISPARATE MANNER (EVEN THOUGH THE CONTRACTOR HAS ACHIEVED ITS GOAL FOR WOMEN GENERALLY, THE CONTRACTOR MAY BE IN VIOLATION OF THE EXECUTIVE ORDER IF A SPECIFIC MINORITY GROUP OF WOMEN IS UNDERUTILIZED).

10. THE CONTRACTOR SHALL NOT USE THE GOALS AND TIMETABLES OR AFFIRMATIVE ACTION STANDARDS TO DISCRIMINATE AGAINST ANY PERSON BECAUSE OF RACE, COLOR, RELIGION, SEX, OR NATIONAL ORIGIN.

11. THE CONTRACTOR SHALL NOT ENTER INTO ANY SUBCONTRACT WITH ANY PERSON OR FIRM DEBARRED FROM GOVERNMENT CONTRACTS PURSUANT TO EXECUTIVE ORDER NO. 11246.

12. THE CONTRACTOR SHALL CARRY OUT SUCH SANCTIONS AND PENALTIES FOR VIOLATION OF THESE SPECIFICATIONS AND OF THE EQUAL OPPORTUNITY CLAUSE, INCLUDING SUSPENSION, TERMINATION AND CANCELLATION OF EXISTING SUBCONTRACTS AS MAY BE IMPOSED OR ORDERED PURSUANT TO EXECUTIVE ORDER NO. 11246, AS AMENDED, AND ITS IMPLEMENTING REGULATIONS, BY THE OFFICE OF FEDERAL CONTRACT COMPLIANCE PROGRAMS. ANY CONTRACTOR WHO FAILS TO CARRY OUT SUCH SANCTIONS AND PENALTIES SHALL BE IN VIOLATION OF THESE SPECIFICATIONS AND EXECUTIVE ORDER NO. 11246, AS AMENDED.

13. THE CONTRACTOR, IN FULFILLING ITS OBLIGATIONS UNDER THESE SPECIFICATIONS, SHALL IMPLEMENT SPECIFIC AFFIRMATIVE ACTION STEPS, AT LEAST AS EXTENSIVE AS THOSE STANDARDS PRESCRIBED IN PARAGRAPH (7) OF THESE SPECIFICATIONS, SO AS TO ACHIEVE MAXIMUM RESULTS FROM ITS EFFORTS TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY. IF THE CONTRACTOR FAILS TO COMPLY WITH THE REQUIREMENTS OF THE EXECUTIVE ORDER, THE IMPLEMENTING REGULATIONS, OR THESE SPECIFICATIONS, THE DIRECTOR SHALL PROCEED IN ACCORDANCE WITH 41 C.F.R. § 60-4.8.

14. THE CONTRACTOR SHALL DESIGNATE A RESPONSIBLE OFFICIAL TO MONITOR ALL EMPLOYMENT RELATED ACTIVITY TO ENSURE THAT THE COMPANY EEO POLICY IS

BEING CARRIED OUT, TO SUBMIT REPORTS RELATING TO THE PROVISIONS HEREOF AS MAY BE REQUIRED BY THE GOVERNMENT AND TO KEEP RECORDS. RECORDS SHALL AT LEAST INCLUDE FOR EACH EMPLOYEE THE NAME, ADDRESS, TELEPHONE NUMBERS, CONSTRUCTION TRADE, UNION AFFILIATION IF ANY, EMPLOYEE IDENTIFICATION NUMBER WHEN ASSIGNED, SOCIAL SECURITY NUMBER, RACE, SEX, STATUS (E.G., MECHANIC, APPRENTICE TRAINEE, HELPER OR LABORER), DATES OF CHANGES IN STATUS, HOURS WORKED PER WEEK IN THE INDICATED TRADE, RATE OF PAY, AND LOCATIONS AT WHICH THE WORK WAS PERFORMED. RECORDS SHALL BE MAINTAINED IN AN EASILY UNDERSTANDABLE AND RETRIEVABLE FORM; HOWEVER, TO THE EXTENT THAT EXISTING RECORDS SATISFY THIS REQUIREMENT, CONTRACTORS SHALL NOT BE REQUIRED TO MAINTAIN SEPARATE RECORDS.

15. NOTHING HEREIN PROVIDED SHALL BE CONSTRUED AS A LIMITATION UPON THE APPLICATION OF OTHER LAWS THAT ESTABLISH DIFFERENT STANDARDS OF COMPLIANCE OR UPON THE APPLICATION OF REQUIREMENTS FOR THE HIRING OF LOCAL OR OTHER AREA RESIDENTS (E.G., THOSE UNDER THE PUBLIC WORKS EMPLOYMENT ACT OF 1977 AND THE COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM).

APPENDIX NO. 1

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER NO. 11246):

(1) THE OFFEROR'S OR BIDDER'S ATTENTION IS CALLED TO THE "EQUAL OPPORTUNITY CLAUSE" AND THE "STANDARD FEDERAL EQUAL EMPLOYMENT SPECIFICATIONS" SET FORTH HEREIN.

(2) (a) THE GOALS AND THE TIMETABLES FOR MINORITY AND FEMALE PARTICIPATION, EXPRESSED IN PERCENTAGE TERMS FOR THE CONTRACTOR'S AGGREGATE WORK FORCE IN EACH TRADE ON ALL CONSTRUCTION WORK IN THE COVERED AREA, ARE AS FOLLOWS:

TIMETABLES GOALS FOR MINORITY PARTICIPATION IN EACH TRADE (SEE APPENDIX NO. 2)	GOALS FOR FEMALES PARTICIPATION IN EACH TRADE 6.9%
GOALS FOR EACH YEAR (SEE APPENDIX NO. 2)	GOALS FOR EACH YEAR 6.9%

(b) THESE GOALS ARE APPLICABLE TO ALL THE CONTRACTOR'S CONSTRUCTION WORK (WHETHER OR NOT IT IS FEDERAL OR FEDERALLY ASSISTED) PERFORMED IN THE COVERED AREA. IF THE CONTRACTOR PERFORMS CONSTRUCTION WORK IN A GEOGRAPHICAL AREA LOCATED OUTSIDE THE COVERED AREA, IT SHALL APPLY THE GOALS ESTABLISHED FOR SUCH GEOGRAPHICAL AREA WHERE THE WORK IS ACTUALLY PERFORMED. WITH REGARD TO THIS SECOND AREA, THE CONTRACTOR ALSO IS SUBJECT TO THE GOALS FOR BOTH ITS FEDERALLY INVOLVED AND NON FEDERALLY INVOLVED CONSTRUCTION.

(c) THE CONTRACTOR'S COMPLIANCE WITH THE EXECUTIVE ORDER AND THE REGULATIONS AT 41 C.F.R. PART 60-4 SHALL BE BASED ON ITS IMPLEMENTATION OF THE EQUAL OPPORTUNITY CLAUSE, SPECIFIC AFFIRMATIVE ACTION OBLIGATIONS REQUIRED BY THE SPECIFICATIONS SET FORTH AT 41 C.F.R. ' 60-4.3(a), AND ITS EFFORTS TO MEET THE GOALS. THE HOURS OF MINORITY AND FEMALE EMPLOYMENT AND TRAINING MUST BE SUBSTANTIALLY UNIFORM THROUGHOUT THE LENGTH OF THE CONTRACT, AND IN EACH TRADE, AND THE CONTRACTOR SHALL MAKE A GOOD FAITH EFFORT TO EMPLOY MINORITIES AND WOMEN EVENLY ON EACH OF ITS PROJECTS. THE TRANSFER OF MINORITY OR FEMALE EMPLOYEE OR TRAINEES FROM CONTRACTOR TO CONTRACTOR OR FROM PROJECT TO PROJECT FOR THE SOLE PURPOSE OF MEETING THE CONTRACTOR'S GOALS SHALL BE A VIOLATION OF THE CONTRACT, THE EXECUTIVE ORDER, AND THE REGULATIONS IN AT 41 C.F.R. PART 60-4. COMPLIANCE WITH THE GOALS WILL BE MEASURED AGAINST THE TOTAL WORK HOURS PERFORMED.

(3) THE CONTRACTOR SHALL PROVIDE WRITTEN NOTIFICATION TO THE DIRECTOR OF THE OFFICE OF FEDERAL CONTRACT COMPLIANCE PROGRAMS WITHIN 10 WORKING DAYS OF AWARD OF ANY CONSTRUCTION SUBCONTRACT IN EXCESS OF $10,000 AT ANY TIER FOR CONSTRUCTION WORK UNDER THE CONTRACT RESULTING FROM THIS SOLICITATION. THE NOTIFICATION SHALL LIST THE NAME, ADDRESS, AND TELEPHONE NUMBER OF THE SUBCONTRACTOR; ESTIMATED DOLLAR AMOUNT OF THE SUBCONTRACT; ESTIMATED STARTING AND COMPLETION DATES OF THE SUBCONTRACT; AND THE GEOGRAPHICAL AREA IN WHICH THE SUBCONTRACT IS TO BE PERFORMED.

(4) AS USED IN THIS NOTICE, AND IN THE CONTRACT RESULTING FROM THIS SOLICITATION, THE "COVERED AREA" IS ***(SEE NOTICE TO BIDDERS).***

APPENDIX NO. 2

THE COMMONWEALTH OF MASSACHUSETTS

SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY
ANTI DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. FOR PURPOSES OF THIS CONTRACT, "minority" refers to Asian-Americans, Blacks, Spanish Surnamed Americans, North American Indians, and Cape Verdeans. "Commission" refers to the Massachusetts Commission Against Discrimination.

II. During the performance of this contract, the Contractor and all of (his) Subcontractors (hereinafter collectively referred to as the Contractor), for himself, his assignees, and successors in interest, agree as follows:

1. In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, age or sex. The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, recruitment layoff; termination; rates of pay or other forms of compensation, conditions or privileges of employment; and selection for apprenticeship. The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Commission setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (M.G.L. Chapter 151B).

2. In connection with the performance of work under this contract, the Contractor, shall undertake in good faith affirmative action measures designed to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, age or sex, and to eliminate and remedy any effects of such discrimination in the past. Such affirmative action shall entail positive and aggressive measures to ensure equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, and in service or apprenticeship training programs. This affirmative action shall include all action required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, age, or sex. A purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. 1. As part of his obligation of remedial action under the foregoing section, the Contractor shall maintain on this project a not less than **17 percent** ratio of minority employee man hours to total man hours in each job category, including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers, and those "classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws.

2. In the hiring of minority journeymen, apprentices, trainees and advanced trainees, the Contractor shall rely on referrals from a multi employer affirmative action program approved by the Commission, traditional referral methods utilized by the construction industry, and referrals from agencies, not more than three in number at any one time, designated by the Liaison Committee or the Commission.

IV. 1. At the discretion of the Commission there may be established for the life of this contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering this

project, herein after called the administering agency, the Commission and such other representatives as may be designated by the Commission in conjunction with the administrating agency.

2. The Contractor (or his agent, if any, designated by him the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

3. The Contractor shall prepare projected manning tables on a quarterly basis. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the Commencement of the period covered, and also when updated, to the Commission and Liaison Committee.

4. Records of employment referral orders, prepared by the Contractor, shall be made available to the Commission and to the Liaison Committee on request.

5. The Contractor shall prepare weekly reports in a form approved by the Commission of hours worked in each trade by each employee, identified as minority or non-minority. Copies of these shall be provided at the end of each such week to the Commission and to the Liaison Committee.

V. If the Contractor shall use any subcontractor on any work performed under this contract, he shall take affirmative action to negotiate with qualified minority subcontractors. This affirmative action shall cover both pre-bid and postbid periods. It shall include notification to the Office of Minority business Assistance (within the Executive Office of Communities and Development) or its designee, when bids are in preparation, of all products, work or services for which the Contractor intends to negotiate bids.

VI. In the employment of journeymen, apprentices, trainees and advanced trainees, the Contractor shall give preference, first, to citizens of the Commonwealth who have served in the Armed Forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates, and, secondly, to citizens of the Commonwealth generally, and, if such cannot be obtained in sufficient numbers, then to citizens of the United States.

VII. A designee of the Commission and a designee of the Liaison Committee shall each have right of access to the construction site.

VIII. Compliance with Requirements

The Contractor shall comply with the provisions of Executive Order No. 74, as amended by Executive Order No. 116 dated May 1, 1975, and of Chapter 151B as amended, of the Massachusetts General Laws, both of which are herein incorporated by reference and made a part of this contract.

IX. Non-Discrimination

The Contractor, in the performance of all work after award, and prior to completion of the contract work, will not discriminate on grounds of race, color, religious creed, national origin, age or sex in employment practices, in the selection or retention of subcontractors, or in the procurement of materials and rentals of equipment.

X. Solicitations for Sub-Contracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and affirmative action.

XI. Bidders Certification Requirement

For Bidders Certification Requirements, please refer to the Form for Bid included in the Proposal Form for this Contract.

XII. Contractor's Certification

The Contractor's certification form must be signed by all successful low bidder(s) prior to award by the contracting agency.

XIII. Compliance - Information, Reports and Sanctions

1. The Contractor will provide all information and reports required by the administering agency or the Commission on instructions issued by either of them and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the Commission to affect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary affirmative action contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency or the Commission as appropriate and shall set forth what efforts he has made to obtain the information.

2. Whenever the administering agency, the Commission, or the Liaison Committee believes the General Contractor or any Subcontractor may not be operating in compliance with the terms of this Section, the Commission directly, or through its designated agent, shall conduct an appropriate investigation, and may confer with the parties, to determine if such contractor is operating in compliance with the terms of this Section. If the Commission or its agent finds the General Contractor or any subcontractor not in compliance, it shall make a preliminary report on non-compliance, and notify such Contractor in writing of such steps as will in the judgement of the Commission or its agent bring such Contractor into compliance. In the event that such Contractor fails or refuses to fully perform such steps, the Commission shall make a final report of noncompliance, and recommend to the administering agency the imposition of one or more of the sanctions listed below. If, however, the Commission believes the General Contractor or any Subcontractor has taken or is taking every possible measure to achieve compliance, it shall not make a final report of non-compliance. Within fourteen days of the receipt of the recommendations of the Commission, the administering agency shall move to impose one or more of the following sanctions, as it may deem appropriate to attain full and effective enforcement:

   (a) The recovery by the administering agency from the General Contractor of 1/100 of 1% of the contract award price or $1000 whichever sum is greater, in the nature of liquidated damages or, if a Subcontractor is in non-compliance, the recovery by the administering agency from the General Contractor, to be assessed by the General Contractor as a back charge against the Subcontractor, of 1/10 of 1% of the subcontract price, or $400 whichever sum is greater, in the

nature of liquidated damages, for each week that such party fails or refuses to comply;

(b) The suspension of any payment or part thereof due under the contract until such time as the General Contractor or any Subcontractor is able to demonstrate his compliance with the terms of the contract;

(c) The termination, or cancellation, of the contract, in whole or in part, unless the General Contractor or any Subcontractor is able to demonstrate within a specified time his compliance with the terms of the contract;

(d) The denial to the General Contractor or any Subcontractor of the right to participate in any future contracts awarded by the administering agency for a period of up to three years.

3. If at any time after the imposition of one or more of the above sanctions a Contractor is able to demonstrate that he is in compliance with this Section, he may request the administering agency, in consultation with the Commission, to suspend the sanctions conditionally, pending a final determination by the Commission as to whether the Contractor is in compliance. Upon final determination of the Commission, the administering agency, based on the recommendation of the Commission, shall either lift the sanctions or reimpose them.

4. Sanctions enumerated under Sections XIII-2 shall not be imposed by the administering agency except after an adjudicatory proceeding, as that term is used M.G.L. c. 30A, has been conducted. No investigation by the Commission or its agent shall be initiated without prior notice to the Contractor.

XIV. Severability

The provisions of this section are severable, and if any of those provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

A. **Contractor's Certification**

A contractor will not be eligible for award of a contract unless such contractor has submitted the following certification, which is deemed a part of the resulting contract:

CONTRACTOR'S CERTIFICATION

_____

Contractor

certifies that:

1. it intends to use the following listed construction trades in the work under the contract _____ and _____

2. will comply with the minority manpower ratio and specific affirmative action steps contained herein; and

3. will obtain from each of its subcontractors and submit to the contracting or administering agency prior to the award of any subcontract under this contract the subcontractor certification required by these bid conditions.

_____

(Signature of authorized representative of contractor)

B. Subcontractors' Certification

Prior to the award of any subcontract, regardless of tier, the prospective subcontractor must execute and submit to the Prime Contractor the following certification, which will be deemed a part of the resulting subcontract:

SUBCONTRACTORS' CERTIFICATION

_____

Subcontractor

certifies that:

1. it intends to use the following listed construction trades in the work under the subcontract and _____

2. will comply with the minority manpower ratio and specific affirmative action steps contained herein; and

3. will obtain from each of the subcontractors prior to the award of any subcontract under this subcontract the subcontractor certification required by these bid conditions.

_____

(Signature of authorized representative of subcontractor)

In order to ensure that the said subcontractors certification becomes a part of all subcontracts under the prime contract, no subcontract shall be executed until an authorized representative of the state agency (or agencies) administering this project has determined, in writing, that the said certification has been incorporated in such subcontract, regardless of tier. Any subcontract executed without such written approval shall be void.

APPENDIX NO. 3

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

DISADVANTAGE BUSINESS ENTERPRISE PARTICIPATION PROVISION

APPENDIX NO. 3

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Please submit with bid package, a separate unavailability certification form for each unavailable DBE.

I. DEFINITIONS

As used in this Disadvantaged Business Enterprise Participation Provision ("Provision"), the following terms shall have the following meanings:

A. Authority

The Massachusetts Bay Transportation Authority, or an officer, employee or agent thereof designated by the Authority for the particular purpose involved;

B. Bidder

Any individual, partnership, joint venture, corporation, or firm submitting a general bid, directly or through an authorized representative, for the Contract;

C. Compliance Monitor

The individual or individuals designated from time to time by the Authority to assist and make recommendations to the Authority with respect to compliance with this Provision;

D. Contract

The contract, executed by the Authority and the Successful Bidder, of which this Provision is a part,

E. Contract Price

The total bid price of the Successful Bidder upon which the Contract is awarded;

F. An Original Affidavit

An original affidavit, in the form annexed to this Provision; to be signed by a Principal of a Disadvantaged Business Enterprise.

G. Original Letter of Intent

An original letter, in the form annexed to this Provision, to be signed by a Principal of a Disadvantaged Business Enterprise with respect to certain work under the Contract;

H. Disadvantaged Business Enterprise

A "Disadvantaged Business" or "DBE" means a small business concern as defined pursuant to Section 8(a) of the Small Business Act (15 U.S.C. s.637 (a)) and Implementing Regulations, which is owned and controlled by one or more socially and economically disadvantaged individuals, or is a Women-Owned Business Enterprise as defined in Paragraph K. of this Appendix 3. For purposes of this Provision, owned and controlled means a business:

1. which is at least 51 percent owned by one or more socially and economically disadvantaged individuals, or in the case of a publicly-owned business, at least 51 percent of the stocks of which is owned by one or more socially and economically disadvantaged individuals; and

2. whose management and daily business operations are controlled by one or more of such individuals.

I. SMALL BUSINESS CONCERN

Means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

J. SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS

Means those individuals who are citizens of the United States (or lawfully admitted permanent residents)
and who are Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans or Asian-Indian Americans and any other minorities or individuals found to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act (15 U.S.C. s.637(a)) :

1. **"Black Americans"**, which include persons having origins in any of the Black racial groups of Africa;

2. **"Hispanic Americans,"** which include persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;

3. **"Native Americans,"** which include persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;

4. **"Asian-Pacific Americans,"** which include persons whose origins are Japan, China, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Samoa, Guam, the U.S. Trust Territories of the Pacific, and the Northern Marianas; and

5. **"Asian Indian American,"** which include persons whose origins are from India, Pakistan, and Bangladesh.

6. Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or culture bias within American society because of their identities as members of groups and without regard to their individual qualities. Personal experiences of substantial and chronic social disadvantage in American society, not in other countries and negative impact on entry into or advancement in the business world because of the disadvantage as defined pursuant to 49CFR Appendix E, Part 26.

   The Personal Net Worth of the principal owner of an Economic Disadvantaged Business may not exceed a threshold of $750,000. In determining net worth, an individual, ownership interest in the disadvantaged firm and the individuals equity in his or her primary place of residence must be excluded from the calculation.

7. Economic disadvantage, economically disadvantaged individuals are socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to the diminished capital and credit opportunities as compared to others in the same or similar line of business who are not socially disadvantaged.

K. A **"Women-Owned Business"** to qualify as a "DBE" means a small business concern as defined pursuant to Section 3 of the Small Business Act and Implementing Regulations, which is owned and controlled by one or more women. For purposes of this provision, owned and controlled means a business:

1. which is at least 51 percent owned by one or more women, or in the case of a publicly-owned business, at least 51 percent of the stocks of which are owned by one or more such individuals; and

2. whose management and daily business operations are controlled by one or more women.

L. Certification Letter

For the purposes of the DBE Provision, this term means the following:

1. A letter from SOMWBA certifying the DBE; or

2. A certification from a local government, state government or federal government entity which is authorized to certify DBE status and which uses the criteria for certification that is equivalent to that used by SOMWBA; or

3. A certification from an agency whose DBE certification process has been approved by FTA; or

4. A certification under Section 8(a) of the Small Business Act (15 U.S.C. s.637(a)).

M. Business Enterprise List

The Authority currently utilizes the business registry entitled, **The State Office of Minority and Women Business Assistance Directory** which is issued by the State Office of Minority and Women Business Assistance (SOMWBA). For the purpose of this provision the term "Business Enterprise List" or "List" shall mean the SOMWBA directory. The companies listed herein as Minority Business Enterprises are identical to those defined by this Provision as Disadvantaged Business Enterprises.

The inclusion of a firm in this Directory is for informational purposes only and does not constitute endorsement of a Contractor, Manufacturer, or Supplier. The Business Enterprise List is available to be viewed at the Authority's Equal Employment Opportunity/Affirmative Action Office.

N. Business Enterprise Unavailability Certification

A written certification, in the form annexed to this Provision, by a Disadvantaged Business Enterprise as to its unavailability for certain work. A SEPARATE UNAVAILABILITY CERTIFICATION FORM IS TO BE FILED FOR EACH UNAVAILABLE DBE.

0. Notice of Opportunity to Meet with Authority

Upon request, a Bidder may be given an opportunity to meet with the Authority with respect to the Authority's determination of the Bidder's compliance with this Provision.

P. Qualified

A DBE contractor is qualified to do specific work if it meets all of the following criteria:

1. it has or is able to obtain any and all licenses required to do such work;

2. it has the necessary experience, organization, technical qualifications, skills and facilities to do such work;

3. it is able to comply with the performance schedule reasonably needed for such work;

4. it does not have an unsatisfactory record of integrity, judgement and performance;

5. it is able to meet the applicable Equal Employment Opportunity requirements; and

6. it is not otherwise ineligible to perform such work under applicable laws and regulations.

Q. Schedule for Participation by Business Enterprise

A schedule, in the form annexed to this Provision, containing certain information with respect to work to be performed by Disadvantaged Business Enterprises.

R. Successful Bidder

The bidder to which the Contract is awarded. Among responsible and responsive Bidders, the one offering the lowest reasonable price, as determined by the Authority, and meeting the DBE requirements of this Provision, shall be awarded the contract. Additionally the ability to meet other contractual obligations, deemed to be appropriate, will be considered before awarding the contract.

S. Unavailable

A Business Enterprise is unavailable to do specific work if:

1. it does not have the knowledge of the terms and specifications of the Contract needed to formulate a proposal to do such work or to decline an opportunity to formulate such a proposal; and

2. it does not intend, or is unable, to make a proposal because of lack of interest, inability to meet the reasonable and ordinary demands connected with doing such work, unwillingness to meet the specifications of such work, unwillingness to work on this project or in this geographic area, or such other reason as is determined by the Authority to be sufficient;

4. a separate DBE unavailability certification form should be utilized for each unavailable DBE. An unavailability certification form is annexed to this provision.

T. Reasonable Efforts

To demonstrate sufficient reasonable efforts to meet the DBE contract goal, a contractor shall document the steps it has taken to obtain DBE participation, including but not limited to the following;

1. Attendance at a prebid meeting, if any, scheduled by the recipient to inform the Contractor of DBE subcontracting opportunities under a given solicitation.

2. Advertisement in general circulation media, trade association publication, and minority- focus media for at least 20 days before bid or proposals are due. If 20 days are not available, publication for a shorter reasonable time is acceptable.

3. Written notification to DBEs that their interest in the contract is solicited;

4. Efforts made to select portions of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the stated goal.

5. Efforts to negotiate with DBEs for specific subbids including at a minimum.

    a. the names, addresses, and telephone numbers of DBEs that were contacted;

    b. a description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed; and

    c. a statement of why additional agreements with DBEs were not reached;

6. Effort made to assist the DBE contacted in obtaining bonding or insurance required by the contractor or recipient.

7. Concerning each DBE, the contractor contacted but rejected as unqualified, as well as the reasons for the contractor's conclusion;

8. Prime Contractor must document that he/she made adequate good faith efforts to meet the goal, even though he/she did not succeed in obtaining enough DBE participation to do so.

    a. The dollar amount of the participation of each DBE firm contacted by Prime Contractor;

    b. Contractor must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.

    c. Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved.

    d. Where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own workforce.

    e. Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to

assist them in responding to a solicitation. The above list of types of actions is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Pursuant to 49CFR appendix A to Part 26 - Guidance Concerning Good Faith Efforts.

II. UTILIZATION OF DISADVANTAGED BUSINESS ENTERPRISES

A. Affirmative Action Obligation

Each Bidder shall take affirmative action, and shall comply with the requirements of the Provision, to achieve the stated goal for the utilization of Disadvantaged Business Enterprises in their performance of work under this Contract. Nothing in this Provision shall be construed to require the utilization of any Disadvantaged Business Enterprise which is either not Qualified or Unavailable. All determinations of compliance or non-compliance with the requirements of this Provision, and of the appropriate consequences of non-compliance, shall be made by the Authority as provided herein. All such determinations shall be final and binding within the Authority and not subject to further administrative review within the Authority. Nothing in this Provision shall be construed to diminish the responsibility of the Authority pursuant to federal and state laws.

B. Stated Goal

The stated goal is to have portions of the work under the Contract performed by Qualified Disadvantaged Business Enterprises for prices totaling not less than 17 percent of the Contract Price. A contractor may count toward its DBE goal 60 percent of the total bid price for its expenditures of its materials and supplies required under a contract and obtained from a DBE regular dealer, and 100 percent of the total bid price of such expenditures to a DBE manufacturer.

C. Joint Venture

A contractor may count toward its DBE goals a portion of the total dollar value of a contract with a joint venture eligible under the standards of this Section III B (3) equal to the percentage of the ownership and controls of the DBE partner in the joint venture. WITH RESPECT TO JOINT VENTURES, WHERE ONE OF THE PRIME CONTRACTORS IS A DBE AND WHERE SUCH DBE'S PARTICIPATION IS COUNTED TOWARD MEETING THE DBE GOAL, SUCH JOINT VENTURES MUST HAVE PRIOR APPROVAL FROM THE AUTHORITY TO BE CONSIDERED ELIGIBLE.

D. Business Enterprise Bidder

A bidder which itself is a Disadvantaged Business Enterprise, may subject to compliance with the applicable requirements of this Provision, achieve the stated goal by complying with the limitation on subcontracting provided under "Subletting or Assignment of Contract" in the Standard Specifications.

E. Contractor Assurances

The Prime Contractor or Subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract.

The Contractor shall carry out applicable requirements of 49CFR, Part 26, in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the Authority deems appropriate.

III. BIDDING REQUIREMENTS AND PROCEDURES PRIOR TO CONTRACT AWARD

A. Pre-Bid Conference

At the prebid conference which shall be held with respect to the Contract, the Authority shall be available to review with prospective Bidders the steps they must take to comply with this Provision and to assist prospective Bidders with respect thereto. No action or failure to act of the Authority at the prebid conference shall in any way limit or otherwise affect the terms of this Provision or any portion thereof; however, Bidders shall be deemed to have notice of information made available with respect to this Provision at the prebid conference. The Authority will be available to the prospective Bidders for review of and assistance with the procedures for compliance with this Provision for Contacts that do not require a prebid conference.

B. Bid Submission

Each Bidder, as part of its bid submission, shall submit the following:

1. A completed Schedule for Participation by Disadvantaged Business Enterprises, listing those Qualified DBEs with which the Bidder intends to contract for the performance of portions of the work under the Contract, specifying the agreed price to be paid to each such Disadvantaged Business Enterprise for such work, identifying in detail the contract items or parts thereof to be performed by each such Disadvantaged Business Enterprise, including a proposed timetable for the performance of each such contract item and providing other information as may be required by the Schedule. No work shall be included in the Schedule which the Bidder has reason to believe the listed DBE will subcontract, at any tier, to other than a Disadvantaged Business Enterprise.

2. A completed and signed original Letter of Intent for each DBE listed in the Schedule;

3. For the purpose of this contract, the MBTA will accept only DBEs who are:

   a. Currently certified by the State Office of Minority and Women Business Assistance (SOMWBA); or

   b. An out of state firm who has been certified by either a local government, state government or federal government entity authorized to certify DBE status or an agency whose DBE certification process FTA has approved; or

   c.

   d. Certified under Section 8(a) of the Small Business Act (15 U.S.C. s.637(a)). In addition, each DBE must execute an original affidavit stating that there has not been any change in its status since the date of its last certification. A BIDDER MUST ATTACH TO ITS DBE SCHEDULE A COPY OF THE DBE's MOST RECENT CERTIFICATION LETTER OR DOCUMENT PLUS THE ORIGINAL

SIGNED AFFIDAVIT AND THE ORIGINAL SIGNED LETTER OF INTENT.

4. For out-of-state firms, the bidder must also attach a copy of the criteria utilized by the certifying agency of the out-of-state firm. The certifying agency must have required at a minimum as a condition that:

   a. Individuals who qualify as disadvantaged must own at least 51% of the business;
   b. The business has been in existence for at least six months; and
   c. The majority owners of the DBE control the day to day management and policy decisions of the firm.

5. In the event the work listed on the Schedule is not sufficient to fulfill the stated goal, a statement by the bidder of the reasons why it believes it is in compliance with this Provision is required. In addition, a list of the names, addresses and telephone numbers of the DBEs contacted by the bidder with respect to the performance of work under the Contract shall be submitted. The listing of a DBE by a Bidder on its Schedule shall constitute a representation by the Bidder that if it is awarded the Contract it will enter into a subcontract with such DBE for the portion of the work and at the price set forth in its bid submission, subject to the terms of this Provision and the Contract. If at the time of bid opening, the MBTA determines that the low bidder has failed to include in its bid package the most recent certification letter or original affidavit for any DBE listed on its DBE Schedule of participation, the bidder will have five days from the date of notification of this failure to present the missing certification letter or original affidavit to the MBTA.

C. Responsiveness of Bid

The total price for work to be performed by a DBE indicated in each Bidder's Bid Schedule for Participation must be sufficient to fulfill the stated goal unless the Bidder shall demonstrate to the satisfaction of the Authority that:

1. It has made every reasonable effort to contact and negotiate with DBEs in an attempt to subcontract work, including every reasonable effort to select the portions of the work proposed to be subcontracted, in order to achieve the stated goal;

2. It was unable, not withstanding such efforts, to achieve the stated goal because DBEs were not Qualified or were Unavailable; and

3. It included in its Schedule such proposed agreements as could be made with such efforts.

The Authority may reject as non-responsive any bid which it determines fails to comply with the applicable requirements of this Provision unless the Authority allows the bid to be amended pursuant to Section III E. Nothing herein shall relieve any Bidder or any contractor performing any work under the Contract from any of the terms, conditions or requirements of the Contract or modify the Authority's rights reserved under "Consideration of Proposals" in the Standard Specifications.

D. Determination of Responsiveness of Bids

1. Investigation and Recommendation by Compliance Monitor

If the apparent low responsive (without regard to the requirements of this provision) and responsible bidder submits a bid which does not meet the DBE stated goal, the bidder will be notified by the Compliance Monitor within 3 days after the bid opening to meet with the compliance monitor at the offices of the Authority or such other place as the compliance monitor may designate. The purpose of this meeting shall be for the Compliance Monitor to consider whether to recommend that the Bidder's bid be determined to be in compliance with the requirements of this Provision or to be non-responsive. At this meeting the Bidder shall have an opportunity to present information and arguments pertinent to its compliance with the applicable requirement. At this meeting, the Bidder shall produce in writing the following information:

a. a detailed statement of the efforts made to contact and negotiate with DBEs, including (I) the names, addresses and telephone numbers of DBEs who were contacted; (ii) a description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed; and (iii) a detailed statement of the reasons why additional prospective agreements with DBEs, if needed to meet the stated goal, were not reached;

b. a detailed statement of the efforts made to select portions of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the stated goal;

c. as to each DBE contacted, but which the Bidder considers to be not Qualified, a detailed statement of the reasons for the Bidder's conclusion and

d. as to each DBE contacted, but which the Bidder considers to be Unavailable, either (I) a DBE Unavailability Certification signed by the DBE, or (ii) a statement from the Bidder that the DBE refused to give such written certification after reasonable request, and a detailed statement from the Bidder of the reasons for the Bidder's conclusion that the DBE was Unavailable.

The Compliance Monitor may require the Bidder to produce such additional information as the Compliance Monitor deems appropriate and may obtain whatever other and further information, from whatever other sources, deemed appropriate. Not later than five (5) days after the initial meeting with the Bidder, the Compliance Monitor shall make a written recommendation to the Authority, which shall include a statement of the facts and reasons upon which it is based.

2. Determination by Authority

Following receipt of the Compliance Monitor's recommendation, the Authority shall send to the Bidder a Notice of Opportunity to meet with the Authority, enclosing a copy of the Compliance Monitor's recommendation. Such Notice shall indicate the date, time and place at which the Bidder may, if it so requests in writing, meet with the Authority and have an opportunity to present pertinent arguments and information relating to the determination by the Authority of the

Bidder's compliance with this Provision. The Authority may request such further information from the Bidder as it deems appropriate, and may rely upon any factual conclusion reported by the Compliance Monitor which is not contradicted by the Bidder. The Authority may also conduct informal conferences, to which the Bidder shall be invited, in which other parties invited by the Authority may offer information relevant to the issues on which its determination will be based. As soon as practicable, the Authority shall make a determination in writing and setting forth the facts and reasons upon which it is based, whether the bid of such Bidder complies with the requirements of this Provision or is non-responsive. A copy of such determination shall be sent to the Bidder. Such determination shall not affect the power of the Authority to reject the Bidder's bid for any other reasons.

3. Consideration of Other Bids

If the Authority deems it advisable in the interests of expediting the award of the Contract, the procedures set forth in this Section III(D) may be carried out with respect to the bids of one or more additional Bidders at the same time as, or subsequent to, that of the apparent low responsive and responsible Bidder, with each such procedure separately conducted. The Authority shall make its determination in the order of price rank in accordance with Section I (R).

4. Failure of Bidder to Participate

Failure of any Bidder to participate in any proceeding applicable with respect to its bid, after written request by the Compliance Monitor or the Authority, may result in a determination that its bid is non-responsive.

E. Amendment of Schedule for Participation by Disadvantaged Business Enterprise

A Bidder may amend its Schedule for Participation by DBEs only when directed to do so by the Authority. A Contractor must demonstrate good faith in its attempts to subcontract work,
including having made every reasonable effort to select the portions of the work proposed to be subcontracted, in order to achieve the stated goal.

IV. REQUIREMENTS AND PROCEDURES SUBSEQUENT TO CONTRACT AWARD

A. Proposal, Execution and Compliance with Subcontractors

The Successful Bidder shall, in the manner prescribed in Art. 6.01A of the Standard Specifications, propose for the Authority's approval, subcontracts corresponding in all respects to the proposed agreements listed on the Successful Bidder's Schedule for Participation by Disadvantaged Business Enterprises included in its bid submission, or on its amended Schedule, if it has been directed to amend its Schedule.

Upon approval by the Authority, the Successful Bidder shall enter into each such approved subcontract and shall thereafter neither terminate any such subcontract nor reduce the scope of the work to be performed by, or decrease the price to be paid to, the DBE thereunder without in each instance the prior written approval of the Authority. The Authority retains the right to approve or disapprove any subcontract with a DBE proposed under this Provision for the same reasons and in the same manner that the Authority may approve or disapprove any other subcontract proposed to it.

If the Authority disapproves a subcontract required to be proposed under this Provision for reasons related to its Form, the Successful Bidder shall propose for approval another subcontract with the same DBE for the same work and at the same price, in a form acceptable to the Authority. If the Authority disapproves a subcontract required to be proposed under this Provision for any other reason, the Successful Bidder shall be excused from proposing that subcontract and shall be subject to the provisions of Section IV (B) (4).

B. Substitution of Subcontractor

1. Excuse from Entering Subcontractor

   If, prior to execution of a subcontract required by this Provision, the Successful Bidder submits a written request to the Authority and demonstrates to the satisfaction of the Authority that; (a) as a result of a change in circumstances beyond its control of which it was not aware and could not reasonably have been aware until subsequent to the date of award of the Contract, (b) a DBE which is to enter into such subcontract has become not Qualified, or 8 that the DBE has unreasonably refused to execute the subcontract; the Successful Bidder shall be excused from executing such subcontract.

2. Rightful Termination of Subcontracts

   If, after execution of a subcontract required by this Provision, the Successful Bidder submits a written request to the Authority that; (a) as a result of a change in circumstances beyond its control of which it was not aware and could not reasonably have been aware until subsequent to the date of execution of such subcontract; (b) a DBE which entered into such subcontract is found to be unqualified or has committed and failed to remedy a material breach of the subcontract, the Successful Bidder shall be entitled to exercise such rights as may be available to it to terminate the subcontract.

3. Determination of Excuse or Rightful Termination

   If the Successful Bidder at any time submits a written request to the Authority under the provisions of either Section IV (B) (1) or Section IV (B) (2), the Authority, as soon as practicable, shall determine whether the Successful Bidder has made the requisite demonstration, and shall not determine that such determination has not been made without first providing the Successful Bidder, upon notice, an opportunity to present pertinent information and arguments.

4. Alternative Subcontracts

   If the Successful Bidder is excused from proposing a subcontract under Section IV(A) or from executing a subcontract under Section IV (B) (1), or rightfully terminates a subcontract under Section IV(B) (2), and without such subcontract the Successful Bidder will not achieve the stated goal, the Successful Bidder shall within 15 days of written notification from the Authority make every reasonable effort to propose and enter into an alternative subcontract or subcontracts for the same work to be performed by another Qualified Disadvantaged Business Enterprise(s) for a contract price or prices totaling not less than the contract price under the excused or terminated subcontract, less all

amounts previously paid thereunder. The Successful Bidder shall be deemed to satisfy the requirements of this Section IV (B) (4) if, within 15 days:

a. it shall propose and enter each such alternative subcontract for the same work; or

b. it demonstrates to the satisfaction of the Authority that it has made every reasonable effort to contact and negotiate with DBEs in an attempt to subcontract the work because DBEs were (I) not Qualified; (ii) Unavailable; or (iii) although Qualified and not Unavailable, unwilling or unable to propose a price for such work equal to or less than the greater of the price originally scheduled for such work (less all amounts previously paid therefor), or the price stated in another bona fide proposal, of which such DBEs had knowledge, submitted by another DBE(s) to which the Successful Bidder proposes to subcontract such work; or

c. it shall propose and enter into subcontracts with another Qualified DBE(s), for prices totaling the price originally scheduled for such work (less all amounts not previously paid therefore) for the performance of other work not included in its Schedule or amended Schedule.

In any situation covered by this Section IV (B) (4), the Compliance Monitor shall promptly meet with the Successful Bidder and provide it an opportunity to demonstrate compliance with these requirements. The Compliance Monitor shall, as promptly as practicable, recommend to the Authority whether the Successful Bidder should be determined to be in compliance with these requirements. The Compliance Monitor may require the Successful Bidder to produce such information as the Compliance Monitor deems appropriate and may obtain whatever other and further information from whatever sources the Compliance Monitor deems appropriate. A copy of the Compliance Monitor's recommendation shall be sent promptly to the Successful Bidder. The Compliance Monitor shall not make his recommendation under this paragraph without giving the Successful Bidder notice and an opportunity to present pertinent information and arguments.

C. Continued Compliance

1. The Authority shall monitor the Compliance of the Successful Bidder with the requirements of this Provision during the course of the work to be performed under the Contract. The Successful Bidder shall permit the Authority to have access to the job site and to necessary records and to examine such information as the Authority deems appropriate for the purpose of investigating and determining compliance with this Provision, including, but not limited to, manning tables, records of expenditures, change orders, observations at the job site and contracts between the Successful Bidder and other parties entered into during the life of the Contract. THE SUCCESSFUL BIDDER MUST CERTIFY, ON FORMS PROVIDED BY THE AUTHORITY, THE DOLLAR VALUE OF WORK ACCOMPLISHED BY EACH SUBCONTRACTOR. THIS CERTIFICATION MUST ACCOMPANY EACH PAY ESTIMATE.

FAILURE TO SUBMIT INFORMATION REQUESTED BY THE AUTHORITY WITHIN SEVEN (7) DAYS MAY RESULT IN SANCTIONS LISTED UNDER SECTION IV (D) OF THIS PROVISION.

2. The Contractor shall permit the authorized representatives of the Massachusetts Bay Transportation Authority, U.S. Department of Transportation and the Comptroller General of the United States to inspect and audit all data and records of the Contractor relating to its performance under the Disadvantaged Business Enterprise Participation Provision of this Contract through the expiration of three years after completion of the Contract with which Federal funds are used.

D. Sanctions for Violations

If at any time the Authority has reason to believe that the Successful Bidder is in violation of its obligations under this Provision, or has otherwise failed to comply with this Provision, the Authority may, in addition to pursuing any other available legal remedy, commence proceedings to impose such sanctions. Such sanctions may include, but are not limited to, one or more of the following:

1. the suspension of any payment or part thereof due the Successful Bidder until such time as the issues concerning the Successful Bidder's compliance are resolved;

2. the termination or cancellation of the Contract in whole or in part unless the Successful Bidder is able to demonstrate within a reasonable time its compliance with the terms of this Provision; and

3. the denial to the Successful Bidder of the right to participate in any further Contracts awarded by the Authority for a period of not longer than three (3) years.

No such sanction shall be imposed by the Authority upon the Successful Bidder without an adjudicatory proceeding conducted by the Authority.

E. PROMPT PAYMENT

In accordance with the Department of Transportation's Disadvantage Business Enterprise Regulations 40CFR, Part 26; all prime contractors are required to pay subcontractors for satisfactory performance of their contracts no later than 15 business days from receipt of each payment the MBTA makes to the prime contractor.

The prime contractor shall also promptly return any retainage payments to the subcontractor within 10 business days after the subcontractors work is satisfactorily completed.

All prime contractors are required to include in their subcontracts language assuring that the prime contractor and subcontractors will use appropriate dispute resolution mechanisms to resolve payment disputes.

If the prime contractor determines the work of the subcontractor to be unsatisfactory, it must notify the MBTA's Construction Project Manager, Contract Administration Department, and DBE Coordinator/ Contract Compliance Office, where applicable. Any delay or postponement of payment among the parties may take place only for good cause and with prior written approval from the MBTA.

The Authority reserves the right to not make payment to the prime contractor for work performed by subcontractors, DBEs and non-DBEs, unless and until the

prime contractor ensures that the subcontractors are promptly paid for the work they have performed.

The prime contractor may be required to provide certified proof of payment to all subcontractors before any subsequent payments to prime contractors are made by the Authority.

Failure by the prime Contractor to comply with this requirement will be construed to be a breach of contract and subject to termination or sanctions specified in the contract.

Form A

SCHEDULE OF PARTICIPATION OF DISADVANTAGED BUSINESS ENTERPRISE

(TO BE ATTACHED TO THE BID FORM)

PROJECT No._____

LOCATION _____

_____

(NAME OF PRIME BIDDER)

NAME OF DISADVANTAGED BUSINESS	ADDRESS	TYPE OF WORK AND CONTRACT ITEMS OR PARTS THEREOF TO BE PERFORMED	PROJECTED START AND FINISH DATE FOR WORK	AGREED PRICE

A COPY OF THE DBE'S MOST RECENT CERTIFICATION AND AN ORIGINAL AFFIDAVIT MUST BE ATTACHED TO THIS SCHEDULE.

Form B

MBTA Contract No._____
Description _____

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT

To: _____
(Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as (check one):

_____ an individual _____ DBE
_____ a partnership _____ a joint venture
_____ a corporation

The Disadvantaged Business status of the undersigned is confirmed
a. on the reference list of Disadvantaged Business Enterprises dated _____, or
b. on the attached Disadvantaged Business Enterprise identification Statement.

The undersigned is prepared to perform the following work in connection with the above project, (Specify in detail particular work items or parts thereof to be performed):

_____
_____
_____
_____
_____

at the following price: _____

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

Items	Projected Commencement Date	Projected Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above work will not be sublet to a non-Disadvantaged Business Enterprise at any tier. The undersigned will enter into a formal agreement for the above work with you, conditioned upon your execution of a contract with the MBTA.

Date_____

_____
Name of Disadvantaged Business Enterprise

By _____

Form C

MBTA Contract No.

DBE AFFIDAVIT

STATE OF_____ (Date _____)

COUNTY OF _____ S.S.

The undersigned being duly sworn, deposes and says that he/she is the

_____
(sole owner; partner; president; treasurer; or other duly authorized official of a corporation)

of _____
(Name of DBE)

and certifies that since the date of its certification by

_____
(SOMWBA or out-of-state certification agency)

the certification has not been revoked nor has it expired nor has there been any change in the minority status of
(Name of DBE)

_____
(Signature and Title of
Person Making Affidavit)

Sworn to before me this _____ day of _____ 20

_____
(Notary Public)

NOTE: The Bidder must attach the DBEs most recent certification letter or document to this affidavit.

Form D

DISADVANTAGED BUSINESS ENTERPRISE UNAVAILABLE CERTIFICATION

I, _____ , _____
(Name) (Title)

of _____ , certify that on
(Prime Bidder) (Date)

I contacted the following Disadvantaged Business Enterprise to obtain a bid for work items to be performed on MBTA Contract No.

Disadvantaged Contractor	Work Items Sought	Form of Bid Sought (i.e., unit price, materials & labor, labor only, etc.)
_____	_____	_____
_____	_____	_____
_____	_____	_____

To the best of my knowledge and belief, said Disadvantaged Business Enterprise was unavailable for work on this project, or unable to prepare a bid for the following reason(s):

Signature: _____

Date: _____

_____ , was offered an opportunity to bid on the
(Name of Business Enterprise)

above-identified work on _____ by _____
(Date) (Source)

The above statement is a true and accurate account of why I did not submit a bid on this project.

_____
(Signature of Disadvantaged Business Enterprise)

_____ (Title)

_____ (Date)

A SEPARATE UNAVAILABILITY CERTIFICATION FORM SHOULD BE COMPLETED FOR EACH DBE

CONSTRUCTION SPECIFICATIONS

FOREWORD

The Authority's "STANDARD SPECIFICATION, BIDDING AND CONTRACT REQUIREMENTS AND DIVISION 1 – GENERAL REQUIREMENTS, dated November 1983"; available at a charge of $5.00 each, and "STANDARD SPECIFICATIONS, CONSTRUCTION, January 1980"; available at a charge of $15.00 either (NEITHER CHARGE IS REFUNDABLE). Copies are available in separate volumes from the MBTA Contract Administration Office, Massachusetts Bay Transportation Authority, Transportation Building, 10 Park Plaza, Boston, MA 02116-3975

The Standard Specifications "Division 1 – General Requirements" are applicable to the work of this Contract by reference as they may be modified, amplified, or added to by these Division 1 – General Requirements Specifications. The Division 1 – General Requirements Specifications Sections are a modified format of the Construction Specification Institute (CSI)

Those Sections of the Standard Specifications – Construction which are cited herein are applicable to the work of this contract as they may be modified, amplified, or added to by these Specifications. The Contractor shall be responsible for obtaining all design manuals, standards, specifications and design details specified herein.

Cross references to Sections, Articles, Paragraphs and Sub-Paragraphs shall refer to the Standard Specifications cited above, as noted.

SUPPLEMENTARY CONDITIONS

FOREWORD

The Authority's Standard Specifications, BIDDING AND CONTRACT REQUIREMENTS AND DIVISION 1 - GENERAL REQUIREMENTS, dated November 1983, as amended, will be applicable to this Contract, is incorporated by reference, and may be purchased from the Contract Administration office, Massachusetts Bay Transportation Authority, Transportation Building, 10 Park Plaza, Boston, Massachusetts 02116-3975, at a charge of $5.00 per copy which is not refundable.

Further Supplementing the Authority's Standard Specifications, Section 00700 - General Conditions, the following Supplementary Conditions will apply.

References to Article Numbers in the following Supplementary Conditions unless otherwise stated are to be the aforesaid Standard Specifications, Section 00700 - General Conditions. In case of conflict between these Supplementary Conditions and the aforesaid Standard Specifications, Section 00700 - General Conditions, these Supplementary Conditions will take precedence and shall govern.

The Supplementary Conditions are included herein to augment the Standard Specifications, Section 00700 - General Conditions, with additional information which is applicable to this project.

The enforcement of the requirements of any of the following Supplementary Conditions of the General Conditions shall not be construed as waiving any of the rights of the Authority contained in any of the other conditions of the Contract.

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SUPPLEMENTARY CONDITIONS

1. ARTICLE 1 - DEFINITION OF TERMS

A. Article 1.01 - DEFINITION OF TERMS

A. Add the following items to the list of definitions:

24 a. Design Engineer and/or Consultant (DMJM+HARRIS, Inc. for Maverick Square Station, and Parsons Brinkerhoff Quade & Douglas, Inc. for Blue Line Vents) has been retained by the Authority as engineering consultant during the construction of Maverick Square Station and Blue Line Vents. The terms "Design Engineer" and "Consultant" are at times interchangeable.

2. ARTICLE 2 - SCOPE OF WORK

A. Article 2.01 - INTENT OF CONTRACT

Designate the existing paragraph as "A" and add the following new paragraph:

B. The Work in this Contract consists of the following major items of Work as detailed in the Contract Documents. This list below is not necessarily complete. It shall be the responsibility of the Contractor to carry out all the Work included in the Contract documents to its completion whether those items of Work are listed hereunder or not. The Work shall be performed to meet the milestones and activities specified in the Supplementary Conditions. The work of the Contract includes the following:

1. Selective demolition and renovation work to the Maverick Square Station area including Lewis Mall area on the Blue Line. Work includes:

a. Renovation of platforms;
b. Renovated adjacent spaces;
c. Major structural renovations to existing station;
d. One new elevator in Base Bid, and a second elevator as an Add Alternates and stair access;
e. New finishes to station;
f. New headhouse structures;
g. New landscaping;
h. Add alternate for City of Boston sitework and streetscape;
i. New electrical unit substation;
j. Upgrade signal and communications systems;
k. Upgrade of emergency tunnel ventilation;
l. Rehabilitation of Unit Substation B2.

3. ARTICLE 3 - CONTROL OF WORK

A. Article 3.01 - AUTHORITY OF THE ENGINEER

Delete paragraph B in its entirety and replace with the following:

B. Attention of the Contractor is directed to the following limitations on the scope of the duties entrusted to the Engineer.

1. The Regulations of the Authority's Board of Directors state that the General Manager is authorized to approve, without prior authorization of the Board, issuance of Change Orders or Extra Work Orders, pursuant to any Agreement previously authorized by the Board or the General Manager, in a total amount not exceeding 7% or $500,000.00 above the contract price of such Agreement, whichever is greater; provided that if the issuance of any such Change Order or Extra Work Order would result in exceeding said 7% or $500,000.00 limitation or if the issuance of any one such Change Order or Extra Work Order would require an expenditure by the Authority of an amount exceeding $500,000.00, it shall not be issued without prior authorization of the Board.

2. The General Manager, as provided by the Regulations of the Board of Directors, has delegated to the Assistant General Manager of Design and Construction the power to approve, without prior authorization of the General Manager or the Board, the issuance of Change Orders or Extra Work Orders, pursuant to any agreement previously authorized by the Board or the General Manager, in a total amount not exceeding 7% or $100,000.00 above the contract price of such agreement, whichever is greater; provided that if the issuance of any such Change Order or Extra Work Order would result in exceeding said 7% or $100,000.00 limitation or if the issuance of any one such Change Order or Extra Work Order would require an expenditure by the Authority of an amount exceeding $100,000.00, it shall not be issued without prior authorization.

3. The General Manager, as provided by the Regulations of the Board of Directors, has delegated to the Chief of Engineering and Construction the power to approve, without prior authorization of the General Manager or the Board, the issuance of Change Orders or Extra Work Orders, pursuant to any agreement previously authorized by the Board or the General Manager, in a total amount not exceeding 7% or $50,000.00 above the contract price of such agreement, whichever is greater; provided that if the issuance of any such Change Order or Extra Work Order would result in exceeding said 7% or $50,000.00 limitation or if the issuance of any one such Change Order or Extra Work Order would require an expenditure by the Authority of an amount exceeding $50,000.00, it shall not be issued without prior authorization.

4. The General Manager, as provided by the Regulations of the Board of Directors, has delegated to the Directors of Design and Construction, the power to approve, without prior authorization of the General Manager or the Board, the issuance of Change Orders or Extra Work Orders, pursuant to any Contract or other Agreement previously authorized by the Board or the General Manager, in a total amount not exceeding 7% or $25,000.00 above the contract price of such agreement, whichever is greater; provided that if the issuance of any such Change Order or Extra Work Order would result in exceeding said 7% or $25,000.00 limitation or if the issuance of any such Change Order or Extra Work Order would require an expenditure by the Authority of an amount exceeding $25,000.00, it shall not be issued, without prior authorization.

5. Employees of the Authority are not authorized to request work to be performed or service to be provided other than as specified above. The Authority will not accept any responsibility whatsoever for extra work performed for which there is no specific proper authorization

4. ARTICLE 4 - CONTROL OF MATERIALS

A. Article 4.02 - CERTIFICATE OF COMPLIANCE

This Article shall be supplemented by addition of the following:

C. Certification of specification compliance shall be furnished for all materials and installation of same as specified throughout the construction specifications. (See sample Certificate of Compliance included on page SC-21.)

B. Add new Article 4.05 as follows:

4.05 ASBESTOS MATERIALS

Contractor shall not furnish or install asbestos or any material containing asbestos under this Contract.

C. Add new Article 4.06 as follows:

4.06 BANNED MATERIALS

A. Lead Paints: Contractor shall not furnish or install lead containing paint on any surface within the limits of the Contract. A lead containing paint is defined by the Consumer Product Safety Commission's Lead Containing Paint Poisoning Prevention act of 1979 as any coating whose dried film contains greater than 0.06% by weight of lead

5. ARTICLE 5 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

A. Article 5.03 - -MOTOR VEHICLES

This Article shall be supplemented by addition of the following:

D. All Diesel Construction Equipment must have emission control devices installed, such as oxidation catalysts or particulate filters on the exhaust system side of the diesel combustion engine equipment.

B. Article 5.04 - INSURANCE REQUIREMENTS

1. Delete paragraphs A through E in their entirety and replace with the following:

A. The Contractor shall carry Commercial General Liability Insurance for personal injury, bodily injury and property damage with limits not less than $1,000,000 per occurrence, $1,000,000 aggregate covering all work performed under this Contract. The insurance should include the following:

1. All operations.

2. Contractual liability.

3. Coverage for the so-called "X, C, U" hazards, i.e., collapse of building, blasting, and damage to underground property.

4. Completed operations hazard for a period of at least two years following acceptance by the Authority of the completed Contract.

5. Use of watercraft, aircraft when applicable.

B. Pollution Liability Insurance

1. The Contractor or his designated Subcontractor shall carry Pollution Liability in an amount not less than $1,000,000 per occurrence and $5,000,000 aggregate, for sudden and gradual occurrences arising out of the work being performed under this Contract including, but not limited to, all hazardous material identified under this Contract.

2. The Contractor shall designate the disposal site and furnish a Certificate of Insurance from the Disposal Facility for Environmental Impairment Liability insurance covering liability for sudden and accidental occurrences in the amount of not less than $3,000,000 per occurrence and $6,000,000 aggregate and shall also include liability for non sudden occurrences in the amount of not less than $5,000,000 per occurrence and $10,000,000 aggregate.

3. The Contractor shall designate the hauler and furnish a Certificate of Insurance from the hauler for Automobile Liability insurance with endorsement MCS90 for the liability arising out of the transportation of hazardous material with an amount not less than $5,000,000 annual aggregate.

4. Certificates of Insurance shall clearly state the hazardous materials exposure identified under the contract.

C. Automobile Liability Insurance - including the use of all vehicles; owned, leased, hired and non-owned, with limits not less than $1,000,000 combined single limit covering all work performed under the Contract.

D. Railroad Protective Insurance

1. Railroad Protective Insurance is not applicable to this Contract.

E. The Contractor shall carry Worker's Compensation Insurance, including Employers Liability Insurance as provided by Massachusetts General Laws, Chapter 152, as amended, covering all work performed by him under the Contract.

F. The Contractor shall carry Umbrella Liability Coverage with limits of not less than $10,000,000 per occurrence, covering all work performed by him under this Contract.

G. The Contractor shall carry Builder's Risk Insurance ("All Risks' form) on a 100 percent completed value basis for the full insurable portion of such Work for the benefit of the Authority, the Contractor and all Subcontractors.

H. The required insurance coverages hereinbefore specified shall be placed with insurance companies licensed by the Massachusetts Division of Insurance to do business in the Commonwealth of Massachusetts and having a Best's rating of B+ or better, shall be taken out before the Contract is commenced and be kept in full force and effect throughout the term of the Contract, shall be primary to and non-contributory to any insurance or self-insurance maintained by the MBTA, and shall require that the MBTA be given at least 30 days advance written notice in the event of any cancellation or materially adverse change in coverage. All such required insurance, with the possible exception of Pollution Liability Insurance, shall be written on an occurrence basis form, as opposed to a claim made basis form. The MBTA shall be named as an additional insured under the Commercial General Liability, Automobile Liability, Umbrella, Pollution Liability, and Builder's Risk Insurance Policies. The Workers'

Compensation and Employers' Liability Insurance Policies shall include a waiver of subrogation in favor of the MBTA which precludes these insurers from being able to make any subrogation claims against the MBTA. All such required insurance shall not contain any exclusions for acts of terrorism, and shall fully cover any acts of terrorism, irrespective of whether such acts of terrorism are caused by domestic or foreign terrorists, and irrespective of whether such acts of terrorism are certified or non-certified by the Secretary of the Treasury, in concurrence with the Secretary of State and the Attorney General of the United States, to be an act of terrorism pursuant to the federal Terrorism Risk Insurance Act of 2002. All such insurance as is required of the Contractor shall be provided by or on behalf of all subcontractors to cover their operations performed. The Contractor shall be held responsible for any modifications, deviations or omissions in the compliance with these requirements by the subcontractors. At the inception date of the Contract and throughout the term of the Contract, the MBTA shall be provided with certificates of insurance evidencing that such insurance policies are in place and provide coverage as required. The following statement affirming that coverage completely complies with contract requirements shall be included in the special items section of the certificate or in an attached special items addendum page:

> The aforementioned insurance coverages completely comply with Article 5.04 Insurance Requirements Paragraphs A - I of MBTA Contract No. **S10CN04**.

I. In the event it is determined during excavation or construction that an asbestos condition does exist, a Licensed Asbestos Specialist shall be employed by the Contractor to perform the asbestos containment and abatement work. Prior to asbestos containment and abatement work, the Contractor shall, through the Licensed Asbestos Specialists, obtain insurance in amounts and types specified by the Authority, naming the MBTA as an additional insured as its interest appears under this Contract. Payment for this work will be made in accordance with Division 1 - General Requirements, Section 01150, Article 1.05. PAYMENT FOR EXTRA WORK.

C. Article 5.15 - SAFETY AND FIRST AID REQUIREMENTS

Delete paragraphs A through D and replace with the following:

A. The Contractor shall have a full-time (all working hours/one each shift) **on-site** experienced Safety Supervisor/Representative, who's **sole** responsibility is on-site safety management. The Contractor shall submit, within five (5) working days after receipt of notification of contract award, to the Engineer (Authority Resident Engineer) a detailed site-specific Safety Program, including the name, experience, and qualifications of the Contractor's full-time, on site Safety Supervisor/Representative and alternate. In the absence of the Safety Representative (e.g. vacation, sick leave, short term shift work not exceeding two weeks) the contractor must assign a full time Authority approved alternate Safety Supervisor/Representative to this contract. All safety submittal's must be approved by the Engineer (MBTA Safety Department) prior to the start of construction. No work at the job site shall begin until the Engineer has reviewed and commented on the Contractor's safety program and safety representatives. Implementation and enforcement of the safety program for the forces of the Contractor and all subcontractors shall be the responsibility of the General Contractor.

B. The Contractor's full-time Safety Supervisor/Representative shall have a thorough knowledge of construction safety and OSHA regulations. If, in the opinion of the Engineer, the Contractor's safety representative is not effective in carrying out the assigned duties as described below, the Engineer may request, in writing, that the Contractor replace the safety representative.

Contractors Safety Supervisors/Representatives and alternate are classified into levels with their qualifications based upon the, extent of their construction safety supervisory experience and capabilities, and the nature of each individual contract. All contracts require a Class III Full-time Safety Supervisor/Representative unless otherwise specified. Qualifications for each classification shall include, at minimum:

Class I

Basic safety and health training (minimum requirement: successful completion of OSHA 10 hour Construction Safety and Health training course):

- Two years experience as a construction safety supervisor where safety was 100% of the position responsibility
- Working knowledge of safety regulations and hazard control measures
- Demonstrated ability to conduct safety training
- Working knowledge of safety specific contract hazardous work procedures Physically able to perform the job.

Class II

Five years experience as a construction safety supervisor, three of which include full-time on-site construction safety experience (minimum requirement: successful completion of OSHA 30 hour Construction Safety and Health training course):

- Specialized safety training relevant to the project
- Demonstrated ability in creating a safe work environment
- Working knowledge of safety regulations and hazard control measures
- Demonstrated ability to conduct safety training
- Working knowledge of safety specific contract hazardous work procedures
- Physically able to perform the job.

Class III

Seven years experience as a construction safety supervisor, five of which include full-time on-site construction safety experience (minimum requirement: successful completion OSHA 30 hour Construction Safety and Health or OSHA's Instructor #500 Training course):

- Specialized safety training relevant to the project
- Demonstrated ability in creating a safe work environment.
- Working knowledge of safety regulations and hazard control measures.
- Demonstrated ability to conduct safety training.
- Working knowledge of safety specific contract hazardous work procedures.
- Physically able to perform the job.

C. The duties of the Safety Supervisor/Representative shall include maintenance of the Contractor's safety program, enforcement of safe practices, and the use of safety equipment and personal protective equipment, and other such activities as may be required by OSHA and the Engineer to maintain job safety and accident prevention. The safety representative shall not be replaced, terminated, nor reassigned without the written approval of the Engineer. A minimum transition of two weeks shall occur. Vacancies in these positions must be filled within two weeks of the vacancy occurring. The Safety Representative shall be assigned full-time to the contract and shall not be utilized concurrently on any other MBTA contract or any other projects outside this MBTA contract.

D. Attention of the Contractor is, specifically directed to the General and Supplementary Conditions of this Contract, which shall be made a condition of each subcontract entered into pursuant to the Contract. Further, that the Contractor and any subcontractor shall not require any laborer or mechanic employed in performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to health or safety, as determined under construction safety and health standards (Title 29, Code of Federal Regulations, Part 1518, Published in the Federal Register on April 17, 1971) promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (83 Stat. 96). This contract will require all contractors and subcontractor to comply one hundred percent (100%) with OSHA's fall protection standard.

E. The Authority may stop any work that it considers to be unsafe.

F. The Contractor shall notify the Engineer 48 hours prior to bringing in any hoisting equipment (cranes, etc.) on the Authority's property. Equipment must be inspected by the Engineer (MBTA Safety Department) before being used on the work site.

G. The Contractor shall assume full responsibility for the safety of all his work. He shall perform work in a manner that will insure the safety of personnel and the work; and not expose personnel and equipment to hazardous or potentially hazardous conditions. All work in the construction of the project shall comply with the requirements of the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) provisions, as well as those of State and local regulations. Safe breathing levels must conform to the Massachusetts Department of Environmental Projection (DEP) standards. In the case of conflict of regulations, the most stringent regulations shall apply.

H. The Contractor shall provide at the site such equipment and medical facilities as are necessary to supply first-aid service to any person who may be injured in the progress of the work. At least one individual member of the contractor's staff, properly qualified with current certification (Red Cross or equivalent) in basic first aid and cardiopulmonary resuscitation (CPR), must be continuously present, on the site at all times when work is in progress. This individual must also have a general knowledge regarding blood borne pathogens. First-aid equipment shall be complete in all respects. The Contractor shall also have standing arrangements for the removal and hospital treatment of any employee who may be injured or who may become ill.

I. The Contractor shall promptly report in writing to the Authority all accidents whatsoever arising out of or in connection with the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses. In addition, if death, or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone to the Authority.

J. If any claim is made by any third person against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the fact in writing to the Authority, giving full details of the claim.

K. All workers employed by the Contractor or subcontractors who work within the MBTA property limits i.e. (Authority's stations, track area right-of-way on and/or adjacent to the power traction system, etc.) shall be required to attend a four (4) hour safety awareness course at the Authority's Safety School. A Fifty Dollar ($50.00) Administrative Service cost will be charged per attendee. This Administrative/ Service cost will be directly invoiced to the contractor by the Safety Department at the end of each month. The contractor shall remit this fee to the Authority within thirty (30) days of said invoice. The location and the time of such school will be at the sole discretion of the Authority. The purpose of this course is to make the Contractor's personnel aware of the particular hazards related to the Authority's operations. Re-certification is required every three years. This

class is separate and in addition to the eight (8) hour Subway Operations Right-of-Way Safety Training.

1. All workers employed by the Contractor or subcontractors who work within the MBTA property limits 1.e. (Authority's stations, track area right-of-way on and/or adjacent to the power traction system, etc.) shall be required to attend a one-day, eight hour training class conducted by Subway Operations Training and the Safety Department. Attendees must successfully complete the Right of Way Safety Training in order to receive a Right of Way license. The license is valid for a two-year period after which the person must attend the Authority's Right-of Way recertification class. To register for the "Right-of-Way" class, contact:

   Supervisor and Chief Rules Examiner of Training
   Cabot RTL Training
   275 Dorchester Avenue, 2nd floor
   Telephone: (617) 222-5377

L. All personnel working on the project site, within the MBTA construction project limits are required to wear a safety vest approved by the MBTA at no additional cost to the Authority. In addition, all personnel working in the MBTA track area or on the platform will require the use of MBTA flagman.

M. Work activities necessitating the traction power system (third rail and trolley wire) deenergization will require the services of an Authority power lineman on site at all times.

N. The Contractor will be required to comply with the applicable requirements of the Environmental Protection Agency's National Emission Standards for Hazardous Air Pollutants, Part 51, Chapter 1, Title 40, Code of Federal Regulations, Subpart B, effective April 6, 1973, and as amended October 5, 1975 (Published October 14, 1975, in the Federal Register), and also subpart M published in June 1984.

O. All equipment used by the contractor on Authority property must be inspected by the Engineer (MBTA System wide maintenance and Improvement representative) prior to use on the work site and shall not be used if considered unsafe or not conforming to Authority specifications. All contractor/subcontractor equipment (including hi-rail) operators must be trained, certified, and properly licensed for each specific piece of equipment they will operate. The contractor/subcontractor must keep a copy of the Manufacturers Operating Manual or instructions onboard the hi-rail equipment at all times. The contractor/subcontractor hi-rail vehicles must be equipped with an exhaust gas purifier, and the hi-rail equipment used shall comply with requirements of the hi-rail equipment manufacturer. Documentation of same must be readily available and provided to the Authority upon inspection. If the contractor/subcontractor equipment is involved in a derailment or a near miss incident or accident which caused injury or exposed personnel to injury and/or caused damage to Authority property, that equipment is subject to the Authority's Impound Policy/Procedure. Contractor equipment to be used on or in the vicinity of the tracks shall be in first-class condition, so as to positively prevent any failure that would cause delay in Authority operations or damage to its property or compromise the health and safety of personnel working on the project. Equipment shall not be placed or operated within fouling distance (15' from the centerline) of track without first obtaining the permission of the Authority.

P. The Authority will not compensate the Contractor for delays or denials to work when the Contractor is in violation of the above regulations.

Q. Heavy Equipment used in tunnel operations must utilize Fire Resistant hydraulic fluids and conform to OSHA 20 CFR 1926.800 (m)(8), and the Massachusetts Fire Prevention Regulations {527 CMR 1.03 (8)} and the Boston Fire Prevention Code {Section 1.05 (b)}.

D. Article 5.18 - PAYMENT OF TAXES

1. Paragraph B, last line:

Change the MBTA Sales Tax Exemption Number from E-000-015-909 to E-042-323-989.

E. Article 5.22 - CONFLICT OF INTEREST

Designate the existing Paragraph as "A" and add the following new paragraphs:

B. No Board Member, officer or employee of the Authority, officer or employee of any independent authority, political subdivision of the Commonwealth of Massachusetts, officer, employee or elected official or any city, county, or town authority within the Commonwealth of Massachusetts, during his/her tenure and for one (1) year thereafter shall have any interest, direct or indirect, in this contract or the proceeds thereof.

C. No member of or delegate to the Congress of the United States shall be admitted to any share or part of this contract or to any benefit arising therefrom.

6. ARTICLE 6 - PROSECUTION AND PROGRESS

A. Article 6.02 - PROSECUTION OF WORK

This Article is supplemented as follows:

1. Delete paragraph A and substitute the following:

A. The Contractor shall commence Work within fifteen (15) calendar days from the date of the mailing of the executed contract to the Contractor unless otherwise ordered in writing by the Engineer; and he shall complete the specified milestones within the days specified below from the date of the mailing of the executed contract to the Contractor.

In the event the Contractor fails to complete the specified milestones within the days specified, liquidated damages will be assessed pursuant to Section 00700, Article 6.09 of the General Conditions for each calendar day of delay in the completion of the specified milestones as follows:

Milestone	**No. of Calendar Days**	**Liquidated Damages**
1. Contractor shall have removed and disposed of all hazardous soils from the site, and submit RAO (Response Action Outcome statement, or a Phase 2 Report must be submitted to DEP by October 3, 2005.	October 3, 2005	$2,500/day
2. Contractor shall have the platforms and signal work completed so that the operation of six (6) Blueline cars may begin by December 31, 2005.	December 31, 2005.	$2,500/day

3. The Contractor shall Substantially complete construction of the Unit Substation B2 structure and surface reconstruction within easement area, and return land taken as a temporary easement back to the Massachusetts Port Authority.	365 calendar days after date of mailing of the executed Contract	$2,500/day
4. Open Lewis Mall Head House to full revenue service (the South Head House will act as the only entrance to the Station while the North Head House is rebuilt)	700 days after date of mailing of the executed Contract	$2,500/day
5. Substantial completion of construction.	912 days after date of mailing of the executed Contract	$2,500/day
6. Project completion of construction.	972 days after date of mailing of the executed Contract	$2,500/day

In no event shall the total amount of liquidated damages for failure to complete the above milestones within the days specified exceed $2,500.00 for any one day.

Additionally, the Contractor is advised that, ***except for those 5 weekend shut downs allowed for and specified in paragraph 1.03 Work Hour Limitations of Section 01010 Summary of Work,*** Blue Line train service will continue to run through the Maverick Station right-of-way area on its daily and routine schedule. The Contractor must plan for, coordinate and safely perform its work at Maverick Station while Blue Line service is maintained, and it shall have no claim for an adjustment in Contract Price or Contract Time as a result of any Blue Line service operations."

B. Article 6.04 - LIMITATIONS OF OPERATIONS

Add Paragraphs B, C, D, E, and F as follows:

B. A Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to Authority property shall submit to the offices of the Assistant General Manager of Design and Construction, the Director of Bus Operations, the Director of Subway Operations, and the Director of Real Estate Management, a request in writing, a minimum of forty-two (42) days prior to the Contractor's planned commencement of any of the above stated activities.

Addresses of the above are as follows:

MBTA's Chief Engineer of Design and Construction

6th Floor
10 Park Plaza
Boston, MA 02116
617 222-3116

Director of Systemwide Maintenance & Improvements
500 Arborway
Jamaica Plain, MA 02130
617 222-5454

Director of Subway Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-4554

Director of Bus Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-3368

Director of Operations Support
10th Floor
45 High Street
Boston, MA 02110
617 222-5460

Director of Safety
2nd Floor
21 Arlington Avenue
Charlestown, MA 02129
617 222-4244

MBTA Commuter Rail Chief:
Stephen Jones
45 High Street, 9th Floor, Boston, MA 02110
By email: sjones@mbta.com 617-222-5879

1. Requests shall specify the name of the owner or the contractor, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and the number of days, including time schedule, the owner or the contractor intends to remain on the property at each location. The Authority will process such requests and meet with the owner or contractor to work out a schedule and phasing for the work plus other arrangements including financial. The Authority shall request a list of the names of each individual who will enter upon or perform work on Authority property.

2. The owner or contractor shall notify the representative of the Design and Construction Department and the appropriate Operations Director at least seventy-two (72) hours prior to entering the property as agreed upon earlier with the Authority. The owner or contractor shall notify the Design and Construction, and Operations Departments immediately if the job is to be closed down unexpectedly and shall again notify the Authority as specified above when work will commence.

3. The owner or contractor shall make all necessary arrangements with the Authority before entering upon the property and perform the work in accordance with an MBTA approved work schedule. The owner or contractor shall not enter MBTA property or perform any work on Authority

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SECTION 01010

SUMMARY OF THE WORK

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A. This Section specifies the general requirements for Summary of the Work in accordance with Standard Specifications Division 1 - General Requirements Section 01010 except as modified herein:

1. The Standard Specification which includes the Instructions to Bidders, General Conditions; and Divisions 1 through 16.

2. The Contract Specifications which includes the Notice to Bidders; Instructions to Bidders; Form for Bid; Various forms and exhibits; Supplementary Conditions; Federal and State requirements; and applicable Sections of Divisions 1 through 16.

3. The separately bound reports listed below which are available for review on request:

   a. Maverick Station Modernization Project-Geotechnical Data Report; dated August, 2003.

   b. Asbestos and Lead-Based Paint Survey-MBTA Blue Line Maverick Station; Dated September 17, 1999.

   c. Soil Sampling Results – Maverick Station. ATC Associates, October, 2003.

4. The Contract Drawings as listed below:

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B. The Contract Drawings are based in part upon existing Drawings that are available for Bidder's review at 500 Arborway, Jamaica Plain, MA, 02130 by appointment only. Another set of these existing Drawings will be available for review at Room 5610, Ten Park Plaza, Boston, MA. Contractors are warned that existing conditions may vary from those indicated on these existing Drawings. Contractor shall verify all conditions in the field. The list of existing Drawings available for review is as follows:

MBTA Plan No.	**Sheet No.**	**Description**
125700	E-1	Electrical Plan Demolition
125701	E-2	Electrical Plan New Work
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A-26502	2 of 45	Maverick Location Plan
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A-26506	6 of 45	Maverick Kiosk Roof Plan, Reflected Ceiling Plan, Details
A-26507	7 of 45	Maverick Kiosk Sections
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A-26515	15 of 45	Maverick Barrier Details
A-26516	16 of 45	Maverick Sign Details & Miscellaneous Details
A-26517	17 of 45	Maverick Plumbing & Ventilation
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E-26538	38 of 45	Detached Plans & Details
E-26539	39 of 45	Detached Plans
E-26540	40 of 45	Power Riser - Plan Snow Melting & Fixture Detail
E-26541	41 of 45	Legend - Schedules & Riser Diagrams

N/A	N/A	Electrical Site Plan
N/A	N/A	Station Floor Plan & Detached Plan
S-26533	33 of 45	Plan & Details
S-26534	34 of 45	Roof Framing & Details

1.02 CONTRACT DESCRIPTION, COMMENCEMENT AND COMPLETION TIMES

A. The Work in this Contract consists of the following major items of Work as detailed in the Contract Documents. This list below is not necessarily complete. It shall be the responsibility of the Contractor to carry out all the Work included in the Contract documents to its completion whether those items of Work are listed hereunder or not. The Work shall be performed to meet the milestones and activities specified in the Supplementary Conditions. The work of the Contract includes the following:

1. Selective demolition and renovation work to the Maverick Square Station on the Blue Line. Work includes:

   a. New platforms;
   b. Renovated adjacent spaces;
   c. Major structural renovations to existing station;
   d. New elevators and stair access;
   e. New finishes to station;
   f. New headhouse structures;
   g. New landscaping.

2. Overhead Catenary System Modifications.

   a. Relocate the Loop detectors in the inbound trolley wire.

   b. Relocate the Section Insulator in the inbound trolley wire.

   c. Relocate the Control Panel, Safety Switch and Control Panel for the Pantograph Detection System.

3. Traction Power System Modifications.

   a. Relocate wayside switch BJ/968 as shown on the Contract Drawing and cut back the four cables and terminate them on the relocated switch.

4. Communications System.

   a. Furnish and install new analog telephone instruments, including all cabling, conduit and additional channel cards required to support telephone communications within the new communications room.

   b. Furnish, test and place in service a new ADA compliant Public Address (PA)/LED signage system including all PA/LED electronics, PA speakers, LED signs, all cabling and conduits consistent with current MBTA standards.

c. Furnish and install CCTV electronics, including video splitters, quad screen splitters, video switch and encoders in the new communications room. Furnish and install new video coaxial cable, power cable and associated conduits.

d. Furnish and install a control and monitoring system utilizing a communication programmable logic controller (CPLC). This system shall include new ADA compliant Passenger Assistance call boxes, audio cable, power cable and associated conduits.

e. Furnish and install FOTS equipment, including multiplexers, channel banks, optical patch panels, VF and DS-1 cross connects in the new station communications room. Also furnish and install FOTS DC power supply equipment, including battery charger, fuse panel and ring generator.

f. Splice existing express communications cables located within the new station construction area into the new station communications room to support the new FOTS.

g. During demolition of the existing station, all communications cable shall be spliced through and protected in place. The integrity of all communications cables and systems must be maintained throughout Contract duration.

h. Relocate existing radio control station and associated hardware to the new communications room. The control station shall transmit and receive on Blue Line, MBTA Police, Boston Fire and Boston Police channels.

i. Installation of all communication components shall be accomplished such that all dependent MBTA communications systems remains in-service during MBTA operating hours. Test all affected communication systems and equipment prior to active service.

j. Test, furnish and install all necessary communication equipment needed to interface the MBTA equipment at 45 High Street to the new equipment being furnished under this Contract.

5. Signal System modifications.

a. Relocate automatic block signal 942 approximately 20 feet west (inbound) complete with all associated signal facilities. This relocation is required to accommodate new train stopping point along the extended inbound platform. The equipment to be relocated shall include, but not to be limited to, the following:

- Signal head
- Insulated joints
- "T" signal
- Impedance bond layout
- Train stop layout including pushbutton

b. Design, furnish and install all required mounting hardware, cables and raceways to accommodate signal relocation.

c. The Contractor shall perform safe braking calculations for existing and future Blue Line rolling stock to ensure safety of modifications to the signal block layout. The Authority, upon request of successful bidder, will provide required criteria. The Contractor shall modify all existing circuitry to conform to final approved signal block layout.

d. Protect existing signal and communications facilities including cables and raceways throughout all phases of construction.

e. Modify signaling portion of the pantograph detection system as necessary to accommodate new train stopping point along the extended inbound platform, including a relocation of existing pantograph detection signals and audio frequency overlay track circuit. These modifications shall be integrated with modifications of the detection equipment.

f. Remove and reinstall existing train status indication panel including all associated cable and mounting hardware.

1.03 WORK HOURS LIMITATIONS

All work within active Blue Line tracks will be performed only during overnight work windows as defined in the Supplementary Conditions, or during scheduled weekend shutdowns.

There will be five (5) weekend shut downs of the Blue Line across Maverick Station allowed, when the station will be closed for Contractors full access to the work.

END OF SECTION

SECTION 01020

ALLOWANCES

1.01 DESCRIPTION

A. This Section specifies allowances for all services, personnel, labor, materials and equipment necessary to perform the work as specified herein. The Contractor shall include in his bid proposal the allowance for each item listed. Except when the Contractor performs the work, he shall not add any Contractor markups, including overhead and profit, except as noted, to these allowance items. The work is further specified in Standard Specification Section 01010 and in the applicable Construction Specifications sections referenced herein.

1.02 ALLOWANCE ITEMS

A. Section 01570 – TRAFFIC REGULATION. Include an allowance amount of $654,000.00 for Traffic Officers Services – Item No. 0130.430.

B. Section 02080 – ASBESTOS REMOVAL. Include an allowance amount of $175,000.00 for Asbestos Removal – Item No. 0212.174.

C. Section 02081 – SOIL MANAGEMENT AND DISPOSAL. Include an allowance amount of $100,000.00 for Licensed Site Professional Services – Item No. 0160.091.

D. Not used.

E. Section 02400 – DRAINAGE AND SEWER SYSTEMS and Section 02713 – EXTERIOR WATER DISTRIBUTION SYSTEMS. Include an allowance amount of $25,000.00 for Boston Water and Sewer Commission Utilities – Item No. 0211.463, for reimbursement costs incurred by the Boston Water and Sewer Commission.

F. Section 02651 – ELECTRIC FACILITIES RELOCATION. Include an allowance amount of $128,000.00 for Electric Service Relocation – Item No. 0211.482, for reimbursement costs incurred by NSTAR Gas & Electric Corporation.

G. Section 02652 – GAS FACILITIES RELOCATION. Include an allowance amount of $35,000.00 for Gas Utility Relocation – Item No. 0211.486, for reimbursement costs incurred by KeySpan Energy Delivery.

H. Section 02653 – TELEPHONE FACILITIES RELOCATION. Include an allowance amount of $35,000.00 for Telephone Relocation – Item No. 0211.488, for reimbursement costs incurred by Verizon.

I. Section 02654 – FIRE ALARM FACILITIES RELOCATION. Include an allowance amount of $5,000.00 for City of Boston Fire Dept. Utility relocation – Item No. 0211.489, for reimbursement costs incurred by the City of Boston Fire Department.

J. Section 10290 – BIRD CONTROL. Include an allowance amount of $20,000.00 for the purchase and installation of Bird Control – Item No. 1029.103, for reimbursement costs incurred by the Contractor.

K. Section 02820 – FOUNTAIN SCULPTURE. Include an allowance amount of $142,000.00 for the removal, storing and reconstruction of the Rock Sculpture – Item No. 0400.100, at Lewis Mall, for reimbursement costs incurred by the Contractor.

L. Section 10450 – FARE COLLECTION EQUIPMENT. Include an allowance amount of $150,000.00 for the work related to the installation of automated fare collection equipment – Item No. 1075.997, for reimbursement costs incurred by the Contractor

M. Section 01563 – RODENT CONTROL. Include an allowance amount of $75,000.00 for the purchase and installation of rodent control material – Item No. 0213.201, for reimbursement costs incurred by the Contractor.

N. Not Used.

O. Section 16050 – BASIC MATERIALS AND METHODS FOR ELECTRICAL WORK. Include an allowance in the amount of $20,000.00 for the replacement of corroded conduit and wiring located at the Tunnel Level at Vent Shaft B5 – Item No. 1600.358, for the reimbursement of costs incurred by the Contractor.

1.03 MEASUREMENT

A. Allowances will be made to reimburse the Contractor for work and materials performed and supplied by the Contractor and others as specified herein and as further specified in the applicable Construction Specification Sections.

1.04 PAYMENT

A. Before permitting work to begin under any allowance, the Contractor shall request an itemized written estimate of cost from the utility companies, private firms, subcontractors, and City and State agencies for the work to be performed. The Contractor shall submit these written estimates to the Engineer for review and approval. For work performed by the Contractor, he shall be reimbursed in accordance with MBTA Standard Specifications, Division 1 – General Requirements, Section 01150, Article 1.05, paragraph B.2. The Authority will make no payments exceeding the amounts.

B. Payment for allowances will be based upon receipted invoices and signed receipts, without charges for Contractor overhead and profit, except when the Contractor performs the work, submitted for the actual work performed.

C. The Contractor shall submit receipted copies of itemized invoices for such work to the Authority for partial payments. Payment will be based upon receipted invoices and signed receipts from the utility companies, private firms, subcontractors, or the City and/or State agencies to the Contractor, four (4) copies of which shall be submitted to the Authority.

D. The final payment for allowances under this Contract will be withheld until the Contractor has paid each affected utility company, private firm, subcontractor, or City and/or State agency for all costs in connection with the work specified herein.

E. Each allowance will be adjusted to the actual amount paid by the Contractor for such work done.

1.05 PAYMENT ITEMS

Item No.	Description	Unit
0130.430	Traffic Officers Services	AL
0212.174	Asbestos Removal	AL
0160.091	Licensed Site Professional Services	AL
0211.463	Boston Water and Sewer Commission Utilities	AL
0211.482	Electric Service Relocation	AL
0211.486	Gas Utility Relocation	AL
0211.488	Telephone Relocation	AL
0211.489	City of Boston Fire Dept. Utility Relocation	AL
1029.103	Bird Control	AL
0400.100	Sculpture Allowance	AL
1075.997	Fare Collection	AL
0213.201	Rodent Control	AL
1600.358	Other Electrical Work	AL

- END OF SECTION -

SECTION - 01030

ALTERNATES

1.01 DESCRIPTION

A. This Section specifies additions to the Base Bid Price for Alternates described below.

B. The General Provisions of the Contract, including General and Special Conditions and the requirements of Division 1, and all other relevant Sections of these Specifications shall apply to the Work in this Section.

C. Work of this Section will be implemented at the discretion of the Authority. For Alternates selected, the Base Bid Price will be increased by the amounts bid for the selected Alternates and as further required by the Drawings and these Specifications.

D. The Authority reserves the right to select and proceed with or without any of the Alternates.

1.02 ALTERNATE NO. 1: ESCALATOR AT SOUTH HEADHOUSE

A. Provide an add-alternate price for providing the two escalators at the South Headhouse as shown on the Drawings. The base bid includes the construction of stairs S-2 and S-3 near column lines 25 and E.4. This add-alternate replaces the S-3 stairs with two escalators, one going in the up direction and the other one down. This includes but is not limited to:

1. The installation of escalator support trusses, motors, handrails, treads, electrical and plumbing connections and all other escalator accessories to make the escalator fully functional. Working points as shown on the contract drawings will be used.
2. Providing a temporary stationary stair system (to be approved by the Engineer) to be used during stage construction, if the fabrication time of the escalator equipment is not ready for the opening the south head house, and removing and disposing of the temporary stair when the escalators can be installed.
3. Installation of a fully working escalator pit sump pump
4. Modifications as required to floor tile and or concrete at the interface of the escalator and the proposed station finished floor surface.

B. The escalators are supported in three locations, at the ends and near middle of the span. It is anticipated that the escalator truss will be installed in two or more pieces. The Contractor shall make arrangements if necessary, to deliver the large pieces for the escalators superstructure via MBTA work trains during non-revenue hours. The contractor's bid for this item shall include reimbursement payments to the MBTA for the use of their equipment if necessary.

C. Complete shop drawings, depicting the escalator equipment, installation and all working points shall be submitted to the Engineer for approval prior to the beginning of any of this work.

D. No modifications to the escalator equipment which would void the manufacturer's warranty are permitted.

E. The contractor shall submit to the Engineer, within thirty days of notice to proceed, a break down of costs, including all quantities, materials, unit prices etc., that make up their lump sum bid.

F. This add-alternate will only be preformed, if directed by the Engineer.

1.03 ALTERNATE NO. 2: SOUTH ELEVATOR AND FARE ARRAY AT SOUTH HEADHOUSE

A. Provide an add alternate price for providing the South elevator and elevator headhouse and Fare Array at the South Headhouse, as indicated on Drawings. This add-alternate involves converting the South Head House from an exit only, as drawn and specified in the base bid, to a full entrance and exit. The scope is as shown on the plans, and includes, but is not limited to:

1. The construction of an elevator head house near column line 27-F, including the installation of a working sump pump, elevator cab, elevator doors, equipment and furniture for the Vertical Control Diagnostic Room, electrical, comunications and plumbing connections, and all additional accessories to make the south elevator completely functional.
2. Changes in signage to facilitate an entrance and exit at the South Head House.
3. All modifications necessary to facilitate a permanent fare array near column line 22.5. (See Section 10450 – FARE COLLECTION EQUIPMENT if directed by the Engineer to install AFC fare array equipment)
4. Elimination of the rotary gate in the south head house at column line EE.2 and replace it with stainless steel glass exit doors
5. Minor changes in grading in Lewis Mall are necessary to facilitate the elevator door elevations.

B. If this add-alternate is performed, the concrete elevator roof cap, as shown in the structural drawings shall be eliminated and replaced with the South Elevator head house as indicated above, and as shown on the plans.

C. The contractor shall submit to the engineer, within thirty days of notice to proceed, a break down of costs, including all quantities, materials, unit prices etc., that make up their lump sum bid.

D. Complete shop drawings, depicting all equipment and materials, and proposed installation methods shall be submitted to the Engineer for approval prior to the beginning of any of this work.

E. This add-alternate will only be preformed, if directed by the Engineer.

1.04 ALTERNATE NO. 3: PLATFORM TILE PAVING:

A. Provide an add-alternate price for providing ceramic tile paving at public platform and passageway areas in lieu of pigmented concrete floor with tile accents. The Ceramic Tile Add-Alternate includes substituting the base bid floor finish (pigmented concrete floor with tile accents) with ceramic floor tiles on a concrete pad in all public platform and passage

way areas, as shown on the plans. No substitutions of head house or plaza floor finishes are included in this add-alternate. The choice of the color, style and texture will be coordinated during construction with Engineer. The choice of tile must be made prior to pouring the concrete setting surface so that the tile thickness can be incorporated and the finished floor elevations, so that the proposed elevations listed in the plans can be achieved.

B. The contractor shall coordinate with the Architect in the selection of tile materials, colors and layouts. Sample tiles shall be submitted to the Engineer for approval prior to ordering materials.

C. The contractor shall submit to the engineer, within thirty days of notice to proceed, a break down of costs, including all quantities, materials, unit prices etc., that make up their lump sum bid.

D. This add-alternate will only be preformed, if directed by the Engineer.

1.05 MEASUREMENT AND PAYMENT

A. Alternates 1, 2, and 3 will be paid for at the Contract Lump Sum prices as specified herein.

1.06 PAYMENT ITEMS

Item No.	Description	Unit
0001.100	ALTERNATE NO. 1	Lump Sum
0001.200	ALTERNATE NO. 2	Lump Sum
0001.300	ALTERNATE NO. 3	Lump Sum

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

1.01 DESCRIPTION

A. This Section specifies the general requirements for Measurement and Payment in accordance with Standard Specifications Division 1 - General Requirements Section 01150 except as modified herein.

1.05 PAYMENT FOR EXTRA WORK

B. Payment for work or materials for which no price is contained in the Contract.

1. If the Engineer directs, the Contractor shall submit promptly in writing to the Engineer an offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. Unless otherwise directed, the stated price shall be divided so as to show that it is the sum of: (a) estimated cost of direct labor, materials, and the use of equipment, plus 10 percent of this total for overhead; (b) actual cost of Workmen's Compensation and Employer's Liability Insurance, Health, Welfare and Pension Benefits, Social Security deductions, and Employment Security Benefits and such additional fringe benefits which the Contractor is required to pay as a result of Union Labor Agreements and/or is required by authorized governmental agencies; (c) a reasonable percent of the total (a) and (b) shall be negotiated for profit utilizing the procedure outlined under this Article, paragraph B.3; (d) the estimated proportionate cost of surety bonds.

2. Unless an agreed lump sum and /or unit price is obtained from above and is so stated in a Supplemental Agreement or an Extra Work Order the Contractor shall accept as full payment for work or materials for which no price agreement is contained in the Contract an amount equal to the following: (a) the actual cost for direct labor, material (less value of salvage, if any) and use of equipment (see below), plus 10 percent of this total for overhead; (b) actual cost of Workmen's Compensation and Employer's Liability Insurance, Health, Welfare and Pension Benefits, Social Security deductions, and Employment Security Benefits and such additional fringe benefits which the Contractor is required to pay as a result of Union Labor Agreements and/or is required by authorized governmental agencies; (c) a reasonable percent of the total (a) and (b) shall be negotiated for profit utilizing the procedure outlined under this Article, paragraph B.3; (d) the estimated proportionate cost of surety bonds. The actual cost of use of equipment (except small tools and manual equipment) will be the actual and necessary operating expenses of such equipment power and fuel for the same, and a reasonable rental for the same as determined by the Engineer.

3. A reasonable percent of the total (a) and (b) for Items 1 and 2 above shall be negotiated for profit on each Extra Work Order utilizing the following weighted guidelines:

   (a) Breakdown:

Profit Calculation Summary Chart

FACTOR	WEIGHT (W)		RATE FACTOR (R=.03 to .08)	PROFIT VALUE
1. Degree of Risk				
General Issues of Concern	10	x	=	
Labor Productivity	15	x	=	
Pricing	15	x	=	
Availability of Materials	5	x	=	
2. Relative Difficulty of Work	15	x	=	
3. Size of Job	15	x	=	
4. Period of Performance	15	x	=	
5. Subcontracting	10	x	=	
TOTAL	100			

(b) Based on the Factors for each Work Order, the Weight (W) for each Factor shall have a Rate Factor (R) from .03 to .08 as indicated below. The Profit Value (V) shall be obtained by multiplying the Rate Factor (R) by the Weight (W). The sum of the Profit Value column represents the fair and reasonable profit percentage as determined by the Factors of the particular Extra Work Order.

DEFINITION OF PROFIT RATE FACTORS

1. Degree of Risk:

   Where the Work associated with a Extra Work Order involves no risk to the Contractor, or the degree of risk is very small, the Rate Factor should be .03; as the degree of risk increases, the Rate Factor should be increased up to a maximum of .08. The Degree of Risk has been determined to include but not limited to the following major factors:

   a) General Issues of Concern
   b) Labor Productivity
   c) Pricing
   d) Availability of Materials

2. Relative Difficulty of the Work involved:

   If the modified Work is most difficult and complex the Rate Factor should be .08 and should be proportionately reduced to .03 on the simplest of jobs.

3. Size of job:

   If the sum of the modified Work (direct costs) is not in excess of 5% of the base Contract work or $25, 000, the Rate Factor shall be .08. Work greater than 10% of the base Contract Work or $50,000 shall have a Rate Factor of .03. Work estimated between 5% ($25,000) and 10% ($50,000) shall be proportionately rated from .08 to .03.

4. Period of performance:

A change during the early phases of a contract shall have a Rate Factor of .03 and should be proportionately increased to .08 as the period of impact approaches the substantial completion. Additionally, the Rate Factor shall be >03 for a time extension less than 10 days to a defined Milestone and as the potential time extension to a defined Milestones increases the Rate Factor shall also proportionately increase to .08.

5. Subcontracting:

The Rate Factor shall be inversely proportional to the amount of subcontracting. Where 66 percent or more of the Work is to be subcontracted, the Rate Factor shall be .08 and where 90% to 100% of the Work is performed by the Contractor's own forces the Rate Factor shall be .03. If the amount of subcontracting is estimated between 11% and 65% of the Work, the Rate Factor shall be proportionately rated from .08 to .03.

C. Equipment Rates

In the event there arises the need for determination of costs for use of equipment as part of "actual costs" or "cost of performance" or "damages" under General Conditions, Section 00700, Articles 2.09, 5.19, 6.07; Section 01150, Measurement and Payment, Articles 1.03 and/or 1.05; or under Chapter 30 of the Massachusetts General Laws, such costs for use of equipment shall be established in accordance with the following:

1. "Construction equipment" as used herein means equipment in sound workable condition, either owned or controlled by the Contractor or the subcontractor at any tier, or obtained from a commercial rental source, and furnished for use under the Contract.

2. Allowable hourly ownership and operating costs for Contractor-owned or subcontractor-owned equipment shall be determined as follows:

a. Actual cost data from the Contractor's accounting and operating records shall be used whenever such data can be determined for hourly ownership and operating costs for each piece of equipment, or groups of similar serial or series equipment. Actual costs shall be limited to booked costs of the annual accounting period or periods during which the equipment was utilized on the Contract, and will not include estimated costs not recorded and identifiable in the Contractor's formal accounting records. The Contractor shall afford Authority auditors full access to all accounting, equipment usage, and other records necessary for development or confirmation of actual hourly cost rates for each piece of equipment, or groups of similar serial or series equipment. The Contractor's refusal to give such full access shall invalidate any request or claim for payment of the equipment costs. When costs cannot be determined from the Contractor's records, hourly equipment cost rates may be determined under "b." below.

b. When the Engineer ascertains that it is not practicable to determine actual equipment cost rates or elements thereof from the Contractor's records, hourly equipment cost rates or elements shall be determined by the use of rate schedules or the formula developed from the "Rental Rate Blue Book" (Volume 1) published by Equipment Watch.:

(1) Hourly rates shall be developed by dividing monthly rates by 176 hours per month (the "weekly," "hourly" and "daily" rates listed in the "Blue Book" will not be used);

(2) Rates shall in all cases be adjusted by application of Rate Adjustment Tables (machine age adjustment) plus adjustment to eliminate Equipment Overhead plus Regional Adjustment; and

(3) Rates shall be further reduced by 20 percent to eliminate duplicate and excessive costs, except that the rates shall instead be reduced by 75 percent to determine standby rates.

The number of hours to be paid for shall be the number of hours that the equipment is actually used on a specific force account activity. The "current revisions" to the Blue Book will be used in establishing rates. The "current revision" applicable to specific force account work will be the "current revision" as of the first day of work performed on that force account work and that rate will apply throughout the period the force account work is being performed. In all cases, the Engineer reserves the right to utilize, in preference to Blue Book rates, equipment cost rates based upon actual costs per accounting records or hybrid rates as described above.

c. In those cases where a 10 percent additive for overhead is to be superimposed on the equipment costs provided in Section 00700, Article 2.09, and Section 01150, Article 1.05, equipment cost rates determined under (a) and (b) shall exclude any overhead costs such as equipment insurance, licenses or taxes. The 10 percent additive shall compensate the Contractor for all overhead costs, including equipment overhead, general superintendence, small tools, manual equipment, field overhead and central office overhead. Where the 10 percent overhead additive is not applicable, overhead items clearly related to equipment, (equipment insurance, licenses, taxes), shall be included in the equipment rates; provided, however, that such costs shall be identified and eliminated from any other direct or indirect costs or damages payable by the Authority under the Contract. No element of profit shall be allowable in equipment cost rates for Contractor-owned equipment; it being understood that a reasonable percent of profit in accordance with Article 1.05, Paragraph B, Item 3 will be superimposed upon equipment costs when called for by the Contract.

3. Reasonable hourly costs of renting equipment are allowable subject to Contractor production of auditable records supporting actual costs incurred, provided further that:

   a. Costs such as fuel, lubricants, and minor or running repairs incident to operating such rented equipment that are not included in the rental rate are allowable.

   b. Costs incident to major repair and overhaul of rental equipment are not allowed.

   c. Charges for equipment leased or rented from any division, subsidiary organization under common control, or business under common ownership, ordinarily will be reimbursable to the extent that they do not exceed the actual costs of ownership and operating costs determined as in "2.", above. Rental cost of equipment leased or rented from any division, subsidiary, affiliate of the Contractor under common control, or business under common ownership, that has an established practice of renting out the same or similar equipment to unaffiliated parties, shall be allowed at rates higher than actual ownership and operating costs, provided that the Contractor furnishes the Authority adequate documentation, including the rental and usage records for the same or similar equipment items, demonstrating a reasonable likelihood that the equipment would have been rented out if not used on this Contract, and that the rental rates charged are consistent with rates charged to unaffiliated parties and going market rates. Rental costs under a sale and leaseback arrangement will be allowable only up to the amount the Contractor would be allowed if the Contractor retained title.

4. Equipment cost rates determined in "2." and "3." above shall be exclusive of labor cost of equipment operators. Such costs shall be reimbursable subject to Contractor production of auditable payroll and other records sufficient for determination of hours, pay rates, and reimbursable fringe costs as defined in Section 00700, Article 2.09 and above.

5. Except in cases of unit price or lump sum extra work orders approved by the Engineer before the work is done, actual reimbursable hours of equipment usage and operator time must be adequately documented by the Contractor's field and office records maintained during performance of the work in a manner acceptable to the Engineer. Failure of the Contractor to so maintain time records which adequately segregate added equipment hours caused by extra work required by the Engineer, or caused by other Authority actions cited in the Contractor's claim for damages, from other equipment

time worked on the Contract, when maintenance of such records would have been feasible, shall constitute a cardinal omission of the Contractor, invalidating any claim for equipment cost reimbursement.

D. Payment for specialized engineering services which may be required in the performance of extra work and which is not otherwise provided for in the Contract shall be for actual costs to be incurred that comply with the standards of the Federal Acquisition Regulations, Part 31, including (a) direct labor based on hours worked on the Contract at the hourly rates paid; (b) overhead costs based on audited financial statements and other data as may be required by the Authority; (c) ten percent of the total of (a) and (b); and (d) other direct expenses related to the Contract.

1.07 PARTIAL PAYMENTS

G. Massachusetts Bay Transportation Authority-Statement of Payment to Subcontractors Form is included at the end of this Section 01150. It must be completed and signed by authorized contractor representative and submitted to the Authority with each payment request.

(S): Refers to Material Supplier

MBTA-CA: Subcontractor-00/^

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY -- STATEMENT OF PAYMENT TO M/W/DBE SUBCONTRACTORS

GENERAL CONTRACTOR _____
CONTRACT TITLE _____
_____

CONTRACT AWARD _____
PERIOD ENDING _____

CONTRACT NO. _____
PAYMENT NO. _____
NET PAYMENT _____
(General contractor's gross amount, less retainage)

M/W/DBE Subcontractors	Trade	(S) Mat.	Subcontractor Awards			Subcontractor Payments			(X) Final
			Award Amount	Adjustment	Revised Amt.	Previously Paid	This Payme	Total	
	M/W/DBE Subtotal		0.00						
Subcontractor (non-M/W/DBE)									
	Subcontractor Subtotal		0.00						
GRAND TOTA			$0.00						

(Per Article II, paragraph B, in Appendix 3 of subject contract)	M/W/DBE Stated Goal	_____ %
(Total M/W/DBE Payments divided by Awarded Contract)	**M/W/DBE Participation**	_____ %
(Total Subcontract Payments divided by Awarded Contract)	**Subcontract Participation**	_____ %
(Grand Total Subcontract Payments divided by Awarded Contract)	**Grand Total - Participation**	_____ %

I hereby certify, under pains and penalties of perjury, that all information provided herein is complete and accurate:

Signed: _____ _____
Authorized Contractor Representative — Date

(S): Refers to "M/W/DBE Suppliers"-- amount shown is 60% of DBE Award Value

End of Section

MBTA- Appendix 3: M/W/DBE-00/^

SECTION 01300

SUBMITTALS

1.01 DESCRIPTION

A. This Section specifies submittals in accordance with Standard Specifications Division 1 - General Requirements Section 01300 except as modified herein.

1.03 SHOP DRAWINGS

A. The Contractor shall submit to the Engineer and Consulting Engineer within 75 days from Notice to Proceed the schedule for submittal of shop drawings (with estimated quantities of drawings with each submittal) to enable the Engineer and the Consulting Engineer to make manpower planning in various engineering disciplines and administration. The review by the Consulting Engineer with "reasonable promptness" is applicable only when drawing submittals are made per the agreed upon schedule. When drawings are returned with comments, there must be an agreed upon duration within which the resubmittal should be made. Resubmittals made at Contractor's own convenience will be reviewed when the Engineer/Consulting Engineer's schedule will permit. Any claims for delay in review will not be entertained for such submittals. The Contractor shall submit with such promptness as to cause no delay in the work, in accordance with the submittal schedule established, the following:

1. For Review: Two reproducible transparencies (equivalent to Ozalid Sepia) and ten (10) blueline prints of Contractor Drawings prepared specifically for this Contract. Ten copies of Contractor standard drawings, catalog cuts, instruction books, renewal parts data lists, tabulations and the like not adaptable for the furnishing of reproducibles. In addition to paper copies all submittals approved for Record shall be submitted as follows:

   a. Shop Drawings: AutoCad R13 or later version (two separate copies on two separate CD's);
   b. Catalog Cuts/Manuals, Etc.: WordPerfect, MS Word, or scanned images (two separate copies on two Separate CD's).

2. For Final Record: Two correctable reproducibles on Mylar of Contractor Drawings prepared specifically for this Contract and all standard manufacturer/vendor shop drawings utilized or applicable for this effort.

   Nine copies of Contractor standard drawings, catalog cuts, instruction books, renewal parts data (full detail, plus recommended support parts list), lists, tabulations and the like not adaptable for the furnishing of reproducibles.

3. Review procedure shall be as follows:

   a. The Contractor shall submit drawings "For Review" directly to the appropriate Consultants Sub-Consultants, MBTA Department, and others as suggested on the Submittal Register (Submittal Register provided by Engineer) with copies to

the Engineer, and the complete detail Data Transmittal Form (Contractor's cover letter).

b. The Consultants and Engineer will review, within 30 days after receipt of submittal, such submittals only for conformance with the design concept of the Contract and for compliance with the information given in the Contract Documents. For submittals on traffic and utility work that may need review by the City of Boston, then the review period will be a minimum of 60 days.

   1) For submittals on curtain walls, exterior walls, entrance systems, vent equipment, and major electrical equipment, including but not limited to: motor-control center; substation equipment; panelboards; transformers; and related equipment and furnishings; the review period will be a minimum of 60 days.

c. In the event the submittal requires changes or further explanation, the Consultants and Engineer will return one marked print of each document directly to the Contractor.

d. If corrections are required by the Consultant and Engineer, the Contractor shall make such corrections and resubmit clean, revised copies of the documents incorporating the revisions as required, again in quantity as in subparagraph 1.1 above directly to the Consultants and the Engineer, and will continue to resubmit in a similar manner until the Engineer determines that the documents are acceptable. The revised copies submitted shall not have the Engineer's previous review stamps on them. Immediately on receipt of drawings with comments from the Engineer the Contractor shall inform in writing the Engineer the schedule for resubmittal of the drawings.

e. When documents are acceptable to the Engineer, they will forward copies of the documents to the Engineer for approval. If acceptable to the Engineer, the Engineer will transmit one copy of each marked "Approved" to the Contractor.

f. In the event substitutes or alternates are proposed, they shall be submitted to the Engineer with a copy to the Consulting Engineer and Subconsultant with a full explanation of the reasons for such substitution and providing proof that they are equal to those specified. Information that will expedite review of the substitutes shall also be submitted. The normal review time is not applicable to the review of substitutes or alternates, nor will a delay resulting from longer review periods associated with substitutes or alternates be recognized.

g. Within four weeks from the date of receipt of approved or approved as noted documents, the Contractor shall transmit final record copies, as in subparagraph 1.2 above, directly to the Consulting Engineer and Subconsultant with a copy of the transmittal to the Engineer.

h. The Contractor shall be responsible for the cost of reviewing a submittal after the second resubmittal, or if excessive numbers of submittals are resubmitted a second time. Excessive is intended to mean over 35% of the total number of submittals submitted. The Contractor shall be backcharged the amount of $100.00 per hour per consultant per review for review of excessive submittals.

Add the following new paragraphs:

N. Request for submittals as specified in these Specifications shall be understood to require approval by the Engineer before implementation by the Contractor.

O. The Contractor shall submit to the Engineer within 75 days from Notice to Proceed a drawing and data list containing titles of Contractor and subcontractor drawings and data and projected date of submittal of each. This list shall be kept up to date by the Contractor and issued every month to the Engineer. This list serves to keep the Engineer informed of the drawing submittals (both present and planned) and facilitates in monitoring progress of the Contractor and the Subcontractors with regard to drawing submittals.

P. Any part of the work which requires prior approval of the Engineer with regard to materials, equipment, details or method of prosecution in accordance with the Contract Documents, shall not be commenced without first obtaining approval. Delay in construction due to the delay in submission of drawings or data, or delay due to submission of incomplete or incorrect drawings or data, shall be to the Contractor's account.

Q. Under certain circumstances, as determined by the Engineer, the Authority may release the documents for construction, procurement, or fabrication even though the documents have comments from the Engineer. In each such case, it shall be clearly understood by the Contractor that the documents are released conditionally, the conditions being that:

1. the documents will be revised and resubmitted as specified for review and approval; and,

2. all comments will be incorporated, not only on the reviewed documents, but in field or equipment installation, as well as on all applicable as-built drawings.

R. The Contractor is advised that Instruction Books and the installation, operating, and maintenance data therein, shall be complete, shall be specifically applicable to this Contract, shall be assembled in hard cover volumes, shall be completely identified for this Contract, and shall be completely indexed so as to identify the contents.

S. Names and addresses of persons of the Authority and of the Engineer to whom submittals and transmittals shall be addressed will be furnished later.

T. Contractor shall forward drawings and data to the Engineer's office by guaranteed next day mail.

U. Wherever in the Contract Plans, working drawings or other drawings, the expression "plus or minus" is contained in a note or dimension, the amplitude of such variations shall be determined by the Engineer.

V. The Contractor is fully responsible for the accuracy, proper fit, and coordination of all parts of the Work.

W. The Engineer's approval of the shop drawing of a component shall not indicate approval of the entire equipment or device in which the component is incorporated.

X. Approval of plans, drawings, and prints does not exempt the Contractor from the ultimate responsibility of providing completely installed, safe, reliable, functioning systems as defined in this Contract.

Y. By approving and submitting shop drawings and samples, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data, or will do so, and that he has checked and coordinated each shop drawing and sample with the requirements of the Work and of these Contract Documents.

Z. The term "by others" shall not be used on the shop drawings; the Contractor shall state by whom related items are to be furnished and installed, and shall indicate items that are not in this Contract (NIC). The Engineer may reject and return to the Contractor, without examination, any shop drawing which does not comply with the above requirements.

AA. Shop Drawings shall indicate adjacent or related work or new or existing structures adjacent or related to the Work.

BB. Review of shop drawings by the Consulting Engineer or Subconsultant and the Authority will be only for general conformity to the Specifications. It should be clearly understood by the Contractor that the Authority or the Consulting Engineer or the Subconsultant will not perform detailed review or check the submittal for accuracy or for performance. Any variances from the Specification shall be specifically pointed out individually by the Contractor in writing other than merely shown on the drawings. Anything shown on the drawings contrary to the Specifications, and not specifically addressed by the Contractor will be deemed unacceptable.

CC. If initial cursory review of shop drawings shows substitutions or alternatives that are not separately addressed in writing, or shows obvious variations from the Specifications and Contract Plans, a letter will be sent to the Contractor stating that the submittal is "Unsatisfactory" and detailed review will not be performed. The drawings in such case will not be returned to the Contractor. This cursory review will continue until drawings submitted are in general conformance with the Contract Documents. Delays in the Contract due to such submittal(s) will be to Contractor's account. No requests for extension of milestone(s) or extension of Contract duration on the grounds of rejection of such submittals will be entertained.

DD. Contractor drawings and other submittals will be given a Foreign Print Identification No. (FP#) by the Authority. This number shall be incorporated on all future revisions and submittals of same drawing and shall be noted on the record Mylar submittals. Any future reference to these items shall refer to FP #.

EE. In addition to Contractor's standard title block designations, all shop drawings, diagrams and instruction booklets title blocks or cover sheets shall contain the following information:

Client:	Massachusetts Bay Transportation Authority
Project:	Light Rail Accessibility Program, Arlington Station

FF. Submittal Transmittal Form: The Contractor shall transmit all submittals along with a Contractor Transmittal Form that has been approved by the Engineer. The Engineer

will provide the Contractor with a sample Transmittal Form to develop an approved form.

1.04 SAMPLES AND TESTS

Add the following new paragraph:

I. All samples shall be submitted in a single package. Sample items submitted are for Authority's review and reference and shall not be considered as part of materials submitted for construction under the Schedule of Bid Prices. No payment will be made for sample items.

1.05 PROGRESS PHOTOGRAPHS

A. The Contractor shall furnish color photographs and slides to the Engineer showing progress of the work. They shall be taken at the start of the work showing existing conditions, monthly, and at completion. The minimum number of photographs to be taken each month shall be ten (10). Take photographs at off-site facilities, such as fabrication plants, suppliers' facilities, or other remote areas as directed by Engineer.

B. Each of the photographs shall show a different view of the work and shall be made at a time and from points designated by the Engineer. The Contractor shall furnish four (4) prints and one color slide of each photograph to the Authority, and one print (4 in. x 6 in.) to the Consultant. The prints shall have gloss finish, and shall be mounted on linen, and shall be 8 inches by 10 inches in size exclusive of a one inch binding margin, unless otherwise noted. Slides shall be standard 35mm color slides in plastic mounts. The Photographs and slides shall be made by a professional photographer or other person experienced in such work who is approved by the Engineer.

C. The prints shall be accompanied by the original film stock negatives. Glass plate negatives are not acceptable. The negatives will be available to the Contractor for additional prints if he so desires, but the negatives will remain the property of the Authority.

D. Photographs which, in the opinion of the Engineer, produce unsatisfactory prints and/or negatives shall be retaken by the Contractor at his own expense.

E. Each set of photographs shall be bound in its own separate binder. Each photograph shall have permanently written on it an identifications number and legible descriptions indicating name of project, title of Contract, number of Contract, date taken, location by station or other identification, descriptive date, Contractor's name, and name of Authority.

F. The Contractor shall furnish a sufficient number of slide storage units such as carousel trays, metal storage boxes, etc. to accommodate the number of slides submitted. Storage unit shall be a type acceptable to the Engineer.

G. Provide a standard portable overhead projector, computer screen overhead projector, laser pointer, and portable screen as approved by the Engineer.

1.05A CONSTRUCTION VIDEOS

A. General: Employ competent video photographer to take pre-construction and construction record videos during course of Work.

B. Provide a minimum of 25 minutes of video each month, taken during installation and at completion of major stages of construction, showing work that will be included in that months Payment Request to the Authority. Provide one copy of each video to the Engineer

1. Preconstruction Video: Prior to start of any work, provide pre-construction video, showing the interior of each area within the existing station. Also, provide a preconstruction video of the existing Arlington Street Church, showing all existing conditions, exterior and interior.
2. Preconstruction Site Video: Prior to start of any work, provide pre-construction video, showing the site, showing existing conditions of adjacent facilities, and existing conditions of existing pavements and site improvements.

C. View and Quantities Required: At each specified time, record Project from different views approved by Engineer. Provide two copies of each video at the first Progress Meeting of each month in conjunction with Payment Requests.

D. Videos: Original videos shall remain property of video photographer. Require that photographer maintain each original for two years from Date of Substantial Completion of Project.

E Costs of Photography: Pay costs for specified video photography and copies. Parties requiring additional videos or copies will pay photographer directly. Furnish additional copies to Engineer at commercial rates applicable at time of purchase.

F. Video: Provide color VHS format.

G. Identify each video on transmittal, listing name of Project, orientation of view, date and time of exposure, name and address of video photographer, and verbal description and commentary on what has been recorded.

H. Techniques: Provide factual presentation, with correct exposure and focus, with high resolution and sharpness, maximum depth-of-field, and minimum distortion.

I. Views Required: Illustrate condition of construction and state of progress. At successive periods of recording, take at least one segment from same overall view as previously. Consult with Engineer at each period of video photography for instructions concerning views required.

J. Monitor: Provide a combination VCR/Monitor unit for use by the Engineer.

K. Maintenance of Video Equipment: Provide all necessary maintenance and repair of video equipment during the duration of the Contract.

1.07 WEB PAGE

A. The Contractor shall set up a World Wide Web site for this Project as approved by the Engineer, where all current RFI's, Submittal Register, CPM Progress Schedules, Correspondence' and Change Orders List are posted and updated daily.

B. A Project Web Site is a web site that is created using software that allows a user to design, build, and manage advanced project web sites that facilitates collaboration among geographically dispersed, cross-functional project teams. The software should have a Web Site building tool and server-side software that will provide advanced functionality that a user can access through a web browser. The software must allow easy customization of web site structure to fit a specific project organization structure such as Active project, Oracle and Frameworks, equal or better.

C. The project web site must have the following functionality:

1. Must have the ability to publish project web sites

2. Must have online review commenting of documents

3. Must have online review redline mark up of CAD files and raster images such as photos and allow the markups to be saved and associated with the correct version of the CAD file or Raster image

4. Must have a notification system through E-mail that allows collaborators to be made aware through E-mail of changes to files on the web site

5. Must have the ability to show the history of the previous versions of files

6. Must have a Request for Information (RFI) engine that gives every user, no matter what level of user a Request for Information (RFI) mailbox.

7. There must be a log that tracks all the Requests for Information (RFI) that have been made on the web site

8. Must be software that can integrate with desktop applications such as Primavera™.

9. Must be a graphically pleasing web site

D. User Access to the Project Web Site: The users of the Project Web Site must be able to access the Project Web Site through a web browser with the specifications shown under Items "E", "F", and "G" below. Each user must have a login and a password to access the site and the software must authenticate them. The software must also have the ability to limit the areas within the Project Web Site where a user can access. There must be users that do not require a license that can view and download files and send and receive RFI's.

E. Software Requirements: The software must have an easy to use web site design tool where no HTML programming is required. There must be software for the server that provides advanced functionality to the Project Web Site so that a user with a web

browser can add files, redline mark up files, and send and receive Requests for Information (RFI).

F. Hardware Requirements:

1. Server
Processor: Intel 400MHz Pentium II w/512K +
Server OS: Windows NT 4.0 or later with
Microsoft Internet Information Server
Memory: 256 MB SDRAM
Project Storage: 12 GB

2. Web Client
Microsoft Internet Explorer 4.01 or higher
Netscape Communicator 4.06, or higher

G. Web Site Hosting: Retain a third party web site hosting service as approved by the Engineer which shall provide web site design, development, deployment and hosting. The web site hosting services shall include site availability 24 hours a day, 365 days a year, network transfer of at least 7 GB per month, fault tolerance or RAID Level 1 (mirroring), backup twice daily incremental and weekly full, guaranteed recovery within maximum 4 hours of down time for hardware failure, full time server support, full time NT Server administration and support, and within 1 hour callback guaranteed support.

H. The contractor must have the Project Web Site up and running within 20 days of notice to proceed. The contractor must have the entire team trained on the use of the software within 30 days of the Project Web Site acceptance and provide refresher/additional training as approved by the Engineer.

I. The contractor must deliver the entire Project Web Site on a CD at the end of the project to the Owner in a file form that the Owner can use to go back and view the web site and download files from the web site if needed.

J. The Project Web Site Solution must be a software solution using hardware specified in Item "F" above. Both the software and the hardware must be purchased for the Authority by the contractor. The contractor must have Internet access for all users of the Project Web Site

K. The contractor must purchase the correct number of licenses for the users of the Project Web Site so that the Project Web Site can be used appropriately.

1.08 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for the work required under this Section. All costs in connection therewith will be considered incidental to the item of Work to which they pertain.

- END OF SECTION -

SECTION 01321

CONSTRUCTION SCHEDULE

1.01 DESCRIPTION

This Section specifies the general requirements and procedures for preparing and submitting Contract Schedules to the Authority for review and acceptance. Detailed requirements for submittals are specified in applicable sections of these Standard Specifications and/or as modified in the Construction Specifications.

1.02 SCHEDULE GLOSSARY

A. The following terms used in this Section or elsewhere in the Contract Documents shall have these meanings:

Activity - An element in the Progress Schedule highlighting or depicting a part of the Work and establishing the time and resources required, for completing that part of the Work.

As-Planned Schedule - Construction Schedule Revision 0 (Rev. 0) Submittal returned by the Authority to the Contractor as "Resubmittal Not Required," with or without comments or objections noted, showing the contractor's plan to complete the work within the Contract Time.

Business Day - Any day except Saturdays, Sundays and legal holidays observed by the Authority. Also termed Work Days.

Days - Refer to Section 00700, Article 1 of the General Conditions.

Contract Float - Number of Business Days between the Contractor's anticipated date for early completion of all or part of the work and the corresponding Contract Time or Contract Milestone(s). Contract Float is further defined as the amount of time any given activity or path of activities may be delayed before it will affect the Contract Time.

Cost Loaded Schedule - Contract Bid Price, broken down by Lump Sum and/or Unit Price Pay Items, distributed on the associated schedule activities in the electronic version of the As-Planned Schedule consistent with the approved Schedule of Prices.

Critical Path - Any continuous sequence of Activities in the Progress Schedule that control achievement of a corresponding Contract Time or Milestone(s).

CPM - The Critical Path Method of planning and scheduling. References to the Critical Path Method (CPM) shall be to CPM construction industry standards that are consistent with this Section 01321.

Construction Schedule - Schedule which shows the Contractor's approach to planning, scheduling, and execution of the work. Includes the Revision 0 and monthly Progress Schedule Submittal(s).

Date for Commencement of Contract Time - The date when the Contract Time starts as defined by Article 6.02 A.

Delays - Slippage of the Early Dates in any Progress Schedule Submittal which forecast any slippage or overrun of Milestone(s) or Contract Times.

Early Completion Schedule - An early completion CPM schedule is one which anticipates completion of all or specified parts of the Work ahead of the corresponding Contract Time.

Early and Late Dates - Early times and late times of performance for the Activities as defined by CPM techniques and as further limited by the requirements of the General Conditions.

Milestone - A key point of progress (zero duration) established in the Construction Schedule and as specified in the Contract Documents under Article 6.02.

Progress Schedule Submittal - A monthly status report of the As-Planned Schedule (Rev. 0) intended to aid in and facilitate the evaluation of a Partial Payment. Submittal to reflect Delays, schedule recovery plans and all other Contractor-initiated schedule revisions, subject to the acceptance by the Authority.

B. Other terms used in this Section shall have the meanings assigned to them elsewhere in the Contract Documents, and if not assigned and where the context will permit, as used or defined in Massachusetts General Laws (M.G.L.).

1.03 CONSTRUCTION SCHEDULE REQUIREMENTS

A. The Contractor's approach to prosecution of the Work shall be disclosed to the Authority by submission of the computerized, cost/resource loaded Construction Schedule required in this Section. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

1. Schedule Planning Session: Within 5 days after the Date of Commencement of Contract Time, and prior to submission of the As-Planned Schedule, the Contractor shall host and conduct a schedule planning session. This session will be attended by the Owner and its consultants. During this session, the Contractor shall present its planned approach to the project (including the Work to be performed by the Contractor and its subcontractors) including, but not limited to: the planned construction sequence and phasing; planned crew sizes; summary of equipment types, sizes, and numbers to be used for each work activity; estimated durations of major work activities; the anticipated critical path of the project and a summary of the activities on that critical path; a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges. This will be an interactive session, and the Contractor shall answer all questions that the Owner and its Consultants may have. The Contractor shall provide 5 copies of a written summary of the information presented during the session to the Owner. The Contractor's As-Planned Schedule and schedule narrative shall incorporate the information discussed at this schedule planning session.

B. The Construction Schedule shall consist of (a) the Construction Schedule Revision 0 (Rev. 0) Submittal (As-Planned Schedule), and (b) monthly Progress Schedule Submittals. The Construction Schedule shall clearly define the prosecution of the Work from the Date of Commencement of Contract Time to substantial completion by using separate CPM activities for, but not limited to: construction; testing; permitting; submittal preparation, reviews, resubmissions and approval; material and equipment deliveries; Authority furnished items; interfaces with other contractors, Public Utilities, etc.; Final Inspection; Punchlist; Milestones and Substantial Completion; Authority training; and move-in. CPM Activities and logic ties shall be detailed as necessary to show the Contractor's Work sequencing and separately define all requisite Authority tasks.

C. In preparing the Construction Schedule Submittals, the Contractor has the responsibility to request clarification from the Authority on any areas of the schedule which reflect the Contractor's interpretations of, or variations from, the requirements of the Contract Documents. The Contractor also has the responsibility to incorporate the Subcontractors and Suppliers input into the schedule for Activities, logic ties, restraint dates, etc. involving their Work.

D. Contractor is herein notified that the Contract work will be monitored by civil and public city and agency groups and that the Contractor should make provisions in their bid for meeting and working with these groups as the progress of the work demands or twice a month, whichever is greater. Contractor's attendance will be mandatory at all meetings.

E. Acceptance of the Construction Schedule by the Authority shall not relieve the Contractor from compliance with the requirements of the Contract Documents, or result in the approval of any variation from the Contract Documents.

F. The current version of Primavera Project Planner®, SureTrak® or equivalent schedule software shall be used for the Construction Schedule. Equivalent software shall run on IBM PC compatible equipment, capable of processing and plotting the Progress Schedule information required in this Section, and create data base files accessible by Windows based software. The Contractor shall inform the Authority of the Construction Schedule software the Contractor will use to comply with the requirements of this Section. If the Contractor selects scheduling software other than Primavera Project Planner® or SureTrak®, the Contractor, at no increase in Contract Price, shall (a) demonstrate the software is capable of processing and producing the Construction Schedule information required in this Section and creating data base files accessible by other software, on IBM PC compatible equipment (b) furnish required licensed copy(s) to the Authority, (c) provide the Authority with sufficient software training at the site, and (d) furnish to the Authority all upgrades and updates acquired from the software vendor during the period allowed for completion of the Work which are used by the Contractor on the Work

G. The Contractor will submit as part of the Rev. 0 and monthly Progress Schedule Submittal(s) a 3-1/2" floppy diskette containing the complete Construction Schedule data files in compliance with the requirements of this Section.

H. Contractor agrees to and guarantees that the Contractor will not:

1. Misrepresent to the Authority it's scheduling or execution of the Work.

2. Utilize schedules substantially different from those submitted to the Authority or any Subcontractor for performance or coordination of the Work, or are not practical.

3. Submit schedules that do not accurately reflect the intent or reasonable expectations of the Contractor and its Subcontractors.

Contractor's failure to substantially comply with this agreement shall be a substantial and material breach of contract. In the event the Contractor fails, refuses or neglects to comply to a significant extent with the requirements of this Section 01321, the Authority may elect any of the following: (a) nullify any mobilization payments previously made, (b) stop payments under the monthly Partial Payment Request Progress Schedule *pay item*, (c) prepare alternate progress schedules, as may be suitable under the circumstances, and deduct from the Contract Price all related costs by Change Order, (d) entitle the Authority to the damages afforded for misrepresentation or fraud by these Contract Documents or applicable law. Continued failure of the Contractor to perform in accordance with the requirements of

this Section 01321 will be reason to place the Contractor in default of his obligation thereunder and terminate the Contract.

1.04 USE OF FLOAT

A. Contract Float is not for the exclusive use or benefit of either the Authority or the Contractor, but must be used in the best interest of completing the project within the Contract Time. If the Early Dates in any Progress Schedule Submittal forecast any slippage or overrun of the Contract Times, the Contractor shall indicate such slippage or overrun by reporting negative Contract Float.

B. The Contractor shall not utilize (1) float suppression techniques in the Construction Schedule, including but not limited to interim dates imposed by the Contractor other than Contract Time(s) and Contract Milestone(s), or (2) the inclusion of activities or constraints in a path or chain leading to a Contract Milestone which are unrelated to the Work as stated and specified in the Contract Documents, or (3) activity durations or sequences deemed by the Authority to be unreasonable in whole or in part.

C. All Contract Time(s) and Milestones shall be imposed, coded and separately identified in all Progress Schedule Submittals in conformance with the Milestone(s) and Contract Time(s) set forth in the Contract Documents. The Contractor shall impose no other date restraints in the Construction Schedule, unless an explanation of their bases is provided and is acceptable to the Authority. Contract Completion and Milestones incorporated in the Contractor's Construction Schedule shall be assigned duration of zero (0) days.

D. Contract Float in an early completion Revision 0 Submittal or Progress Schedule Submittal shall be calculated based on the definitions given in the Contract, regardless of the float values shown in any Construction Schedule Revision Submittal or Progress Schedule Submittal.

E. Extensions of time for performance of the Work required under the General Conditions pertaining to equitable time adjustment will be granted only to the extent that the equitable time adjustment for activities affected by any condition or event which entitles the Contractor to a time extension, exceed the Contract Float along the path of the activities affected at the time of Notice to Proceed of a Contract Modification or commencement of any delay or condition for which an adjustment is warranted under the Contract Documents.

F. If the Contractor is delayed in performing the Work, the Contractor shall absorb any related delay, disruption, interference, hindrance, extension or acceleration costs, however caused, until all Contract Float, if any, is consumed and performance or completion of the Work, or specified part, necessarily extends beyond the corresponding Contract Times.

1.05 ACTIVITY REQUIREMENTS

A. Activity durations shall equate to the Business Days required to complete the Work included in each Activity. Activities shall be in sufficient detail to separate items of Unit Price Work from lump sum Work, breakout distinct classes of Work (e.g., CSI Divisions/Sections or equivalent) and Work in separate areas or locations, as specified by the Authority. Work being performed by DBE firms shall be identified as separate CPM activities.

B. Installation Activities shall last from ten (10) to thirty (30) Business Days, unless shorter durations result from the rules in paragraph 1.05.A, and have a value not exceeding $50,000. Submittal Review Activities shall be thirty (30) Business Days, unless different review times are specified in other sections of the Contract Documents.

C. Activities shall be assigned consistent descriptions, identification codes and sort codes. Sort code schemes shall: (a) be subject to the Authority's prior consent; (b) group Activities using meaningful schemes defined by Contractor and the Authority; and (c) designate lead responsibility for each Activity.

D. The total Contract Price shall be allocated to the CPM activities. The cost coded schedule shall be directly related to the Bid Form, Schedule of Bid Prices (Section 01150). Other data such as the proposed number of business (working) days per week, manpower allocation by crew size and type, the planned number of shifts per day and the number of hours per shift, shall all be included in the computerized Construction Schedule.

1.06 SCHEDULES; REPORTS; PLOTS; NARRATIVES

A. Activity Reports shall include Activity identification code, description, duration, calendar, Early Dates and Late Dates, Total Float and sort codes as specified by the Authority. The Late Finish Date of any Activity representing a Milestone shall equal the corresponding Contract Time. In addition, Activity reports shall show, for each Activity, all preceding and succeeding logic ties (lead/lag and lead times) or attach a separate report combining such Activity and logic tie data.

B. Time Scaled Logic Diagrams shall be arrow or precedence and shall be plotted on MBTA Standard Size 22"x 34" sheets with a calendar heading acceptable to the Authority. Logic diagrams shall identify the Contract Time(s) and Critical and sub-Critical Path(s). Activities shall show the Early Dates, Remaining durations and Total Floats. Logic connectors will be shown for all predecessors and successors.

C. Resource Plots shall graph weekly, monthly and cumulative labor and construction equipment plots for Primes and Sub-contractors, as designated by the Authority. Resource plots shall be based on current Early Dates and Late Dates and, when requested by the Authority, shall compare *As-Planned* Early Dates and current Early Dates

D. Cash Flow Plot shall graph monthly and cumulative, in a scale acceptable to the Authority, the total activity dollar value scheduled to be in place based on both early and late finish dates, noting actual monies invoiced.

E. Each Look-Ahead Schedule shall display the activities planned at the closing (i.e., data, cut-off) date that cover the previous two (2) weeks and the next four (4) weeks.

F. The Cost Distribution (CD) shall allocate the Contract Price, as provided in the Bid Form, Schedule of Bid Prices (Section 01150), to the schedule activities by significant Sections of the Specifications within areas, buildings and facilities, or vice versa. If requested by the Authority in writing, there shall be separate CD reports for self-performed Work and the Work of each Subcontractor. Delivery activities, where appropriate, shall be cost-loaded if the Contractor intends to request payment for stored materials. The total of activity values should roll up to their corresponding Contract Pay Items. Once the Construction Schedule Revision 0 Submittal, with the corresponding CD, is approved, the Contractor shall not modify any CD Values, unless otherwise authorized by the Authority in writing.

G. Each Narrative shall list the Activities on each Critical Path and compare Early Dates and Late Dates for Activities designating Contract Times.

1. A Rev. 0 narrative shall be included which details (a) the Contractor's site management plan (e.g., lay down, staging, traffic, parking, etc.), (b) the use of construction equipment and resources, (c) basis and assumptions for critical activity durations and logic, (d) compliance with winter weather requirements, and (e) any shifts, non-Business Days and multiple calendars applied to the Activities.

2. For each Progress Schedule Submittal, the narrative also shall recap progress and days gained or lost versus the previous Progress Schedule, describe changes in resources to be used on remaining Work and identify Delays, their extent and causes. For Progress Schedule Submittals, each narrative also shall itemize changes in Activities and logic ties caused by each Change Order, schedule recovery plans and grouping of related Contractor-initiated revisions.

H. Each narrative shall certify that the Contractor has not been delayed, as of the closing date, by any act, error or omission of the Authority, except as otherwise specifically stated in the narrative or identified in a claim submitted in accordance with the General Conditions of the Contract. Any determination by the Authority will be binding on the Contractor if the Contractor fails to do so.

1.07 CONSTRUCTION SCHEDULE REVISION 0 SUBMITTAL

A. The *initial* Revision 0 Submittal shall be due within ten (10) Days after receipt of the Commencement of Contract Time, and shall include at least the first three (3) months of the forthcoming complete Rev. 0 Submittal.

B. The *complete* Rev. 0 Submittal shall be due with the first partial payment. The Construction Schedule Rev. 0 Submittal shall reflect the Work as awarded and shall purposely exclude any Delays, Change Orders, "or equal" materials and equipment and substitutions of any kind.

C. Each Revision 0 Submittal shall include an electronic computer disk with the Contractor's schedule data files (including activity data, logic, coding, resource and cost data), a narrative and four (4) copies of the specified Activity Reports, Time Scaled Logic Diagrams, Cash Flow Plots, Resource Plots, Look Ahead Schedule and Cost Distribution as defined in paragraph 1.05, all in formats, sorts and sequences acceptable to the Authority.

D. Once the Rev. 0 Submittal (or Rev. 0A, or Rev. 0B, etc. for a resubmission) is returned to the Contractor as "Resubmittal Not Required," with or without comments or objections noted, it shall become the *As-Planned* Schedule. Once established, the *As-Planned* Schedule shall be used as the basis for Progress Schedule Submittals.

E. The first partial payment shall be not be made until the Authority returns to the Contractor the Initial Rev. 0 Submittal as "Resubmittal Not Required." The second partial payment shall not be made until the Authority returns to the Contractor the *complete* Rev. 0 Submittal as "Resubmittal Not Required".

F. In the event the Authority is unable to accept the complete Rev. 0 Submittal and the *As-Planned* Schedule is not established, the Contractor shall submit *unapproved* Progress Schedule Submittals as specified by the Authority, each reflecting the Contractor's approach to completion of Work remaining, progress of the Work and schedule issues in dispute.

G. The Construction Schedule shall incorporate the Contractor's best estimate of the Activities and logic ties required to perform items covered by allowances within the limits of the Contract Times.

1.08 PROGRESS SCHEDULE

A PROGRESS SCHEDULE SUBMITTAL

1. Progress Schedule Submittals statusing the *As-Planned* Schedule Submittal shall be due with each partial payment request, starting with the third request and with each subsequent monthly partial payment request. The Progress Schedule Submittal is a prerequisite to processing the Partial Payment Request.

2. Each required Progress Schedule Submittal shall include an electronic computer disk with the Contractor's schedule data files (including activity data, logic, coding, resource and cost data), a narrative and four (4) copies of the reports, schedules and plots, defined in paragraph 1.06, all in formats, sorts and sequences acceptable to the Authority.

3. The Contractor shall uniquely identify each Progress Schedule Submittal by using a numbering convention similar to that used on technical Submittals. Resubmissions shall be assigned the corresponding Submittal number and the letter A, or B, or C, etc., and shall fully address all the Authority's review comments and objections on the previous Submittal.

4. Progress Schedules Submittals shall reflect progress up to the closing (i.e., data, cut-off) date, forecasted finish for in-progress Activities and re-forecasted Early Dates for Activities planned in the next update period. The current Progress Schedule Submittal should incorporate all proposed Activity, logic and restraint date revisions required to (a) implement changes in the Work, (b) detail all impacts on pre-existing Activities, sequences and restraint dates, (c) recover schedule, (d) reflect the Contractor's current approach for Work remaining, (e) incorporate any Delays that are being negotiated between the Authority and Contractor, and (f) reflect "or equal" or substitution proposals. Progress up to the closing date shall be limited to changes in logic ties and as-built dates for completed and in-progress Activities. As-built data shall include actual start dates (excluding premature starts), remaining durations, actual finish dates (when dependent Work could/did proceed), Delays and other events significant to the Progress Schedule that occurred since the previous Progress Schedule Submittal. Any revisions for the Contractor's convenience shall be excluded when reconciling an extension to a Milestone or Contract Time.

5. Once the Progress Schedule Submittal is returned by the Authority as "Resubmittal Not Required," it shall be used by the Contractor as the basis for next Progress Schedule Submittal. If the Authority is unable to accept any Progress Schedule Submittal, the Contractor shall submit *unapproved* Progress Schedule Submittals as specified by the Authority, each reflecting the Contractor's approach to completion of Work remaining, progress of the Work and schedule issues in dispute.

6. The Authority and Contractor shall employ the accepted Progress Schedule, subject to the Contractor's position on the Authority objections to outstanding schedule issues, to monitor progress against the Contract Time(s), evaluate the effect of Delays on Contract Time and Contract Price and support the justification for any assessment of liquidated damages.

7. In the event the evolution of the Progress Schedule is interrupted, paragraph 1.08 B.3 provides Delay evaluation and Progress Schedule update procedures which shall be binding on both the Authority and Contractor.

B. DELAY PROVISIONS

1. Review with the Authority progress of work bi-weekly. Unless otherwise directed in writing by the Authority, whenever this review, as determined by the Authority indicates a late completion of the work, or should activities shown on the Progress Schedule Submittal slip by ten (10) or more Days beyond any Contract Time or Milestones, the Contractor shall be required to, at no extra cost to the Authority, prepare and submit a recovery schedule which displays how the Contractor intends to reschedule those activities, in order to regain compliance with the Contract Time or Milestones. The Contractor will also submit a narrative, which shall describe the cause of schedule slippage and actions taken to recover schedule within the shortest reasonable time (e.g., hiring of additional labor, use of additional construction equipment, expediting of deliveries, etc.).

2. Schedule recovery will be excused if the Contractor requests and demonstrates entitlement to an extension in Contract Time, in writing, due to delay(s) not within the control of the Contractor, and the Authority concurs schedule recovery is not required at that time. Any Contractor request for adjustment in Contract Time and Contract Price will not be evaluated unless (a) the Contractor, using the procedures in this Section and the Contract, shows that conditions justifying adjustments in Contract Time and/or Contract Price have arisen, and (b) the Contractor's analysis is verifiable through an independent review by the Authority of the electronic disk files for the Progress Schedule Submittal provided by the Contractor.

3. In the event the Authority is unable to return any Progress Schedule Submittal as "Resubmittal Not Required," and the effect of Delays on Contract Time and Contract Price need evaluation, both the Authority and Contractor shall employ the *As-Planned* Schedule and not any *unapproved* Progress Schedule Submittal for such evaluations. The procedure for updating the *As-Planned* Schedule and including Activity, logic tie and restraint date revisions is specified in paragraphs 1.08 B.3.A and 1.08 B.3.B, respectively.

   A. The Contractor will provide a separate electronic disk file of the *As-Planned* Schedule statused for all activities in progress or completed through the time periods for each delay issue or significant project events. Each updated schedule will be compared and analyzed, identifying any slippage between the actual dates for any impacted or delayed activities and the *As-Planned* Schedule. This schedule slippage can then be correlated to the Delay Issues that occurred between two (2) schedule update periods.

   B. For each update window schedule submitted, revisions in Activities, logic ties and restraint dates affecting Work after that update window shall be included only if they are identified and jointly agreed to be incorporated by the Contractor and the Authority.

4. Determination and extension of Contract Time will be in accordance with Article 6.08. Contractor acknowledges and agrees that the actual delays in activities which, according to the Progress Schedule Submittal, do not affect any Contract Time or Milestone shown by the critical path in the network, do not have any affect on the Contract Time or Milestone and therefore will not be the basis for a change therein.

5. The Contractor's failure, refusal or neglect to comply with the requirements specified in Section 01321 Article 1.08 B.1 shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence. If faced with such situation, the Authority may (a) demand adequate, written assurance of due performance, as required in Section 00700 Article 6.09 (b) direct

alternate schedule recovery actions. If in the judgment of the Authority it appears that the Contractor cannot complete his Work within the scheduled time, then the Contractor shall work overtime, additional shifts or adopt such other procedures as may be necessary to restore adherence to the schedule. The full cost of any such recovery work efforts shall be borne by the Contractor, and/or (c) withhold liquidated damages, as provided in Article 6.09.

1.09 MEASUREMENT AND PAYMENT

A. MEASUREMENT

1. A fixed price not to exceed $400,000.00 will be made to reimburse the contractor for CPM Scheduling. Payment will be made under Item No. 0110.002, CPM Scheduling, to the Contractor.

B. PAYMENT

1. Fifteen percent (15%) of the fixed price for CPM Scheduling will be made upon return to the Contractor of the CPM Construction Plan Rev.0 Submittal as "Resubmittal Not Required" (As-Planned Schedule).

2. The remaining (85%) will be pro-rated in equal amounts on each subsequent application for payment upon the Authority's receipt and approval of the monthly CPM updates. The number of months to be used for the pro-rating will be the number of months estimated to complete the work as defined under Article 6.02 - Prosecution of Work. The final month pro-rated amount will not be made until the final application for payment.

3. All payments are subject to retainage.

C. PAYMENT ITEM

Item No.	Description	Unit
0110.002	CPM SCHEDULING	FP

END OF SECTION

SECTION 01331

CHAMP MANAGEMENT SYSTEM
REQUIREMENTS

1.01 DESCRIPTION

A. This section specifies CHAMP, a software application that is specifically designed to monitor conformity with State and Federal affirmative action and Disadvantaged Business Enterprise (DBE) laws and regulations (see Appendices No.1, 2, and 3) The Authority expects this software to support the administration of Executive Order 11246, 390 and Bill 2142, EEO Requirements and Disadvantaged Business Enterprise Utilization Requirements more efficiently and effectively than typical manual methods. The use of CHAMP will eliminate the need for manual production of weekly work hour reports, DBE Payment forms and annual contractor workforce reports.

1.02 EQUIPMENT

A. The specified management system is comprised of software products marketed under the trademark CHAMP by Washington and Rice, LLC, 27629 Chagrin Blvd., Suite 201, Woodmere, Ohio, 44122, 216-591-9130. The contractor shall obtain this software from Washington and Rice, LLC.

1.03 DETAILS

A. The contractor shall import text files of CHAMP compatible payroll data into the CHAMP software. The contractor and all approved subcontractors shall create these payroll files via an export from their computerized company payroll systems and/or manual data entry. After award of the contract and prior to notice to proceed, the contractor shall, if necessary, purchase CHAMP software and arrange for technical support and training from the indicated sources as follows.

1. Washington and Rice LLC.

2. The Contractor shall purchase one copy of the CHAMP Contractor Module (CM) to support the contractors import of contractor and subcontractor payroll data, compliance monitoring and creation of required CHAMP reports.

3. The Contractor shall purchase a copy (ies) of the CHAMP Subcontractor Module(SM) to support manual entry of payroll data by it's subcontractor (s) in instances where a subcontractor (s) does not own CHAMP and cannot create compatible import files from their company payroll system.

4. The Contractor shall obtain file specifications for the payroll import file.

5. The Contractor shall obtain technical advice and assistance regarding software, installation and operation.

6. The Contractor shall obtain CHAMP training from an Authority approved vendor.

1.04 BASIS OF ACCEPTABILITY:

A. For the duration of the contract, the contractor shall. :The Contractor shall keep the CHAMP software updated with contractor and subcontractor data;

B. The Contractor shall provide a diskette containing the exported contract file and hard copies of required reports in accordance with established submittal procedures, and;

C. The Contractor shall install vendors issued upgrades and maintain the software to ensure data submissions are made using the most recent version of the software.

D. The contractor shall bear all costs associated with the purchase of all hardware, software and training associated with the CHAMP Management Program.

E. The contractor or its subcontractors shall not re-sell any module of the CHAMP Management Program.

1.05 SYSTEM FEATURES

A. Champ-CM provides the following features:

1. Work Force Utilization

a. Establish goals for project by race, gender, and craft
b. Automatic assignment of work force hours to projects
c. Import work hours capability
d. Graphic display of work hours actual versus goals

2. On-Job-Training (OJT)

a. Establishes OJT Plan for projects
b. Track Hours for Apprentices and trainees
c. Presents OJT graphic information

3. DBE Monitoring

a. Establishes DBE goals for project
b. Tracks payments to Prime & DBE's.

4. Reporting

a. Generates monthly utilization reports
b. Generates form 1391
c. Work Force information
d. DBE summary
e. Work Force listings.

1.06 MINIMUM SYSTEM REQUIREMENTS

A. Computer and related components
1. A 486DX computer or higher
2. 8 Megabytes or more of memory
3. 128 Cache memory
4. 1 megabyte VRAM
5. PC-DOS or MS-DOS version 3.3 or higher
6. Microsoft Windows 3.1or higher
7. A 3.5" high density disk drove
8. 25 MB hard disk space for the deployment DLLs, Database, BD files, ODBC and EXE
9. VGA display

10. Windows supported mouse

1.07 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item of work to which they pertain.

END OF SECTION

SECTION 01400

QUALITY CONTROL

1.01 DESCRIPTION

A. (This Section replaces MBTA Standard Specification 01400 - Quality Control)
This Section specifies the general requirements for quality assurance and quality control including source of supply and quality of materials, acceptance testing by the Engineer, control testing by the Contractor, off-site inspection, use of local materials, provisions for a proportioning plant office and coordination of finishes.

1.02 QUALITY ASSURANCE PROGRAM

A. The Contractor is responsible for controlling the quality of Work including work of its Subcontractors and suppliers and for assuring that the specified quality is achieved. The Contractor, Subcontractors and suppliers shall establish, maintain and implement a written Quality Assurance Program meeting the requirements of Exhibit 1. The Program shall be tailored to the scope and complexity of the Work and shall include implementing procedures. Subcontractors or suppliers may use the Contractor Quality Assurance Program in lieu of developing their own.

B. The overall administration of the Quality Program shall be vested in a responsible section of the Contractor's organization. This section shall contain a QC Organization headed by an on-site QC Manager who has clear access to top level management and to Subcontractors' officers responsible for the execution of the Subcontractor's QC Program. The QC Manager's sole duty is to manage and administer the QC Program unless otherwise authorized in writing by the Engineer. Such authorization can be withdrawn at any time. The QC Manager shall have at least five (5) years experience in quality control inspection on construction projects.

C. The QC Organization shall be staffed by technically competent personnel with freedom to make decisions without pressure or bias and shall have sufficient authority to ensure that quality requirements are consistently maintained.

D. Submittals

The Contractor's and Subcontractor's QC Program and the resume of their Quality Control Manager shall be submitted to the Engineer for review and acceptance within three weeks of the notice to proceed.

1.03 SOURCE OF SUPPLY AND QUALITY

A. If the Engineer so desires, materials will be approved at the source of supply before delivery.

B. Unless otherwise stipulated in the Contract Specifications, furnish all materials required for the Work specified in the Contract, and said materials shall meet the requirements of the Specifications for the kind of Work involving their use.

C. Unless otherwise provided, only new and first quality materials conforming to the requirements of the Specifications and approved by the Engineer shall be used in the work, except for material used by the Contractor for his convenience and which is not to be permanently incorporated in the work.

D. If after testing, it is found that sources of supply which have been approved do not furnish a uniform product, or if the product from such source proves unacceptable at any time, the Contractor shall, at no additional expense to the Authority, take any and all steps necessary to furnish acceptable materials.

1.04 OFF-SITE INSPECTION

The Engineer may inspect the production of material, or the manufacture of products at the source of supply. Off-site plant inspection, however, will not be undertaken until the Engineer is assured of the cooperation and assistance of both the Contractor and the material producer or manufacturer. The Engineer, or an authorized representative, shall have free entry at all times to such parts of the off-site plant concerned with the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The Engineer assumes no obligation to inspect materials at the source of supply. The responsibility of incorporating satisfactory materials in the Work rests entirely with the Contractor, notwithstanding any prior inspections or tests.

1.05 ACCEPTANCE TESTING

A. Acceptance testing is the testing of materials and workmanship by the Engineer for acceptance of the completed Work. The Engineer will perform acceptance testing of materials and workmanship in accordance with the Contract Documents and reserves the right to perform additional testing at any time to determine conformance with the Contract requirements.

B. Acceptance testing by the Engineer is not to be considered as a replacement for control testing conducted by the Contractor or a manufacturer producing materials for the Contract. Acceptance testing will be at the expense of the Authority.

1.06 HOLD AND NOTIFICATION POINTS

The Contractor will be required to notify the Engineer when certain activities will be performed. These notifications and time requirements will be detailed in the various sections of the Specification. There will be two types of notifications as follows:

Hold Point - A point in a function or process at which inspection is planned to be performed by the Engineer and beyond which work may not proceed without prior approval from the Engineer.

Notification Point - A point in a function or process at which inspection may be performed by the Engineer. The Engineer must be notified at this point and work may proceed.

Failure to provide sufficient notice to the Engineer or violating a "Hold Point" may result in the subsequent rejection of the work. Any correction of the work will be at the expense of the Contractor.

1.07 CONTROL INSPECTION AND TESTING

A. Control inspection and testing is the testing or inspection of materials prior to their delivery from a manufacturer, or during construction, such as soils tests before and after compaction, concrete tests during placement, except for concrete strength tests which will be performed by the Engineer, and such other tests and inspections specified in the various sections of the Specifications to ensure compliance

with Contract requirements. The Contractor shall assume full responsibility for control inspection and testing and give sufficient notice to the Engineer to permit the witnessing of the inspections or tests. Control inspection and testing shall be at the expense of the Contractor and may be performed by independent firms.

B. The Contractor shall submit the name, address, and qualifications, together with the scope of proposed services, of proposed inspection or testing firms to the Engineer for approval at least 30 days prior to the scheduled commencement of any work involving such inspection or testing.

1.08 TEST REPORTS

Within five days after completion of testing performed by or for the Contractor, submit test results to the Engineer. The Contractor shall identify the test reports required to be submitted as specified in Section 01300. Test reports shall be identified with the information specified for samples in Section 01300 and additionally, the name and address of the organization performing the test, the date of the tests and a signature of an authorized representative attesting to the validity of the test results.

1.09 LOCAL MATERIALS

Materials such as crushed stone, gravel borrow, or ordinary borrow, shall be sampled at the source and, if satisfactory, given preliminary approval for use. Samples shall be taken by or in the presence of the Engineer. The Contractor shall furnish such facilities as the Engineer may require for collecting and forwarding samples to the Authority Laboratory. Samples shall be furnished without charge and with any shipping charges prepaid. However, preliminary approval by the Engineer does not relieve the Contractor of the responsibility for placing satisfactory material in the Work as determined by subsequent samples taken at the source or on the Contract site, prior to the material being incorporated into the Work and if the Contract site samples test satisfactorily the material will be considered to meet the Contract requirements as to quality. If such sampling and testing reveal that the material is unsatisfactory it shall be removed from the Work or blended in with such other materials so that an acceptable material will be produced. Removal and blending of such material shall be done by the Contractor without additional compensation.

1.10 PROPORTIONING PLANT OFFICE

Where required by the applicable Section of the Contract Specifications, provide adequate space at the Portland Cement concrete proportioning plant and at the bituminous concrete proportioning plant, for the exclusive use of the Engineer and his inspectors. Adequate safety measures shall be provided and maintained at the plant at all times.

1.11 COORDINATION OF FINISHES

A. Within a reasonable time after Award of Contract, and unless otherwise included in the Contract Drawings the Engineer will provide a color coordination schedule designating colors and textures of finish materials in areas where required.

B. It is the intent of the Contract Documents to produce harmony of matching finish, texture, and color throughout various components of the Project.

C. Coordination Requirements

1. Coordinate work of like materials to achieve the above-mentioned intent by submitting to the Engineer for approval pilot samples of acceptable ranges of color variation and of finish textures.

2. Coordination is especially required for concrete surfaces: metals including anodized aluminum; glass; sealants; hardware; floor, wall and ceiling coverings; painted surfaces; equipment items; and paving of dry nature.

D. Upon obtaining the Engineer's acceptance of any range of colors and textures, furnish the Engineer with one record set of samples, or more if required, and keep sufficient sets for use in coordinating conformity with this record set.

1.12 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

EXHIBIT I

CONSTRUCTION CONTRACTOR QUALITY CONTROL PROGRAM

Contractor shall establish and maintain a written Quality Control Program tailored to the complexity and scope of the Work. The Program shall cover, as a minimum, the following elements: Organization, Document Control, Design Control, Procurement Control, Control of Subcontractors, Special Process Control, Inspection, Non-Conformance Items, Records and Auditing. The Program shall be submitted to the Engineer for review and acceptance prior to commencement of the work. The Program shall be designed to monitor and document the quality of the work as specified in the contract documents.

The Quality Control Program is not intended to relieve the Contractor from its responsibility under the Contract, nor to replace the external inspections of the Work carried out by, or on behalf of the Engineer. Contractor personnel performing Quality Control Program activities shall be experienced and adhere to the details of the program. The Resume of the person responsible for quality activities at the site shall be submitted along with the documented Quality Control Program. The Engineer reserves the right to audit this Program during implementation

ORGANIZATION

This section shall describe the Contractor's organization, including reporting relationships within and external to the Contractor's organization. Duties and responsibilities within the said organization shall be stated. The name and title of the individual responsible for the implementation of the Quality Control Program shall be clearly stated and this individual shall have the organizational freedom to report errors and deficiencies directly to upper management without interference from manufacturing/construction. This individual shall have sufficient power and authority to require that effective corrective actions are taken to correct deficiencies in the Work or Program. Organizational chart(s) shall be prepared which depicts the Contractor's organizational structure and major reporting lines and relationships.

DOCUMENT CONTROL

This section shall describe the methods used by the Contractor to control the use of the various design documents, shop drawings, procedures and other documents which specify quality requirements to assure that only the latest reviewed and approved documents are used and distributed to the individuals performing the Work. The contractor shall have a method to recall documents which have been superseded, revised or recalled. The Contractor shall describe the process used to determine what submittals are required by the Contract and the system used to track these submittals and their current status.

DESIGN CONTROL

This section shall describe the methods used by the Contractor to control any Design process (i.e. working and shop drawings), for which the Contractor is responsible. This should include the selection of design input data, checking for correctness, completeness, compatibility and format, reviewing and approving deign output documents and assuring that the proper interface with design organizations occurs.

PROCUREMENT CONTROL

This section shall describe the methods used by the Contractor to assure that all materials/equipment purchased for the Work are as specified. Included shall be appropriate shop inspections requirements and provisions for

the review of purchase documents to assure that correct details have been specified, including specification, grade, type, color, country of origin or other aspects as required by the contract specifications and drawing. The Contractor shall include in all purchase orders a clause allowing the right of access of the Engineer to inspect or monitor the Work at any time during the manufacturing/fabrication process. The Contractor shall describe receiving inspection activities performed to determine that the correct material/equipment has been delivered. This activity shall be documented on the attached Material Receiving Inspection Report and include documentation of Inspections performed and reviews of material test reports, certificates of conformance/compliance or other documentation required by the Contract. As a minimum, receiving inspections will be performed on the following:

Material requiring a Certificate of Compliance/Conformance
Source Controlled Material not inspected at the Manufacturer
Job controlled Materials (other than concrete, bituminous and soils) which require tracking for testing or payment purposes
Equipment

After completion of receiving inspection activities, obtain the signature of the Engineer. The form, along with associated documents, should be submitted with the pay application package.

CONTROL OF SUBCONTRACTORS

This section shall describe the methods used by the contractor to assure that all the applicable requirements of the Contract are passed on to the subcontractor. Included in this section will be the methods used by the Contractor to monitor and control the quality of the work performed by subcontractors and obtain the required records.

For fabrication under the terms of the Contract, the Contractor must notify the Engineer as to the source of supply and place of fabrication. In order to assign inspection personnel, the Contractor must notify the Engineer as to the date of beginning of fabrication and the date the material is to be delivered to the project. Quality assurance inspection will be performed by the Engineer at the fabricators shop. Failure to notify the Engineer of the commencement of fabrication will be cause for rejection and shall not be incorporated into the work.

It is the Contractor's responsibility to notify all fabricators and suppliers of the specification requirements of the various Contract Documents. The fabricator must also have a Quality Control Program which complies with this Exhibit. The Contractor is advised that the Contract requires all fabrication of structural steel and metal components be performed only by the companies who are approved by the Engineer.

SPECIAL PROCESS CONTROL

This section shall describe the measures used to assure that any special process such as but not limited to: welding, high strength bolting, nondestructive examination, critical coatings, surveys, control of critical tolerances, etc., are controlled by procedures and performed by qualified personnel and the results are properly documented. In addition, where required by specification, the process, personnel and equipment shall be qualified prior to the work activity; the Contractor shall describe the method used to verify, document and track these requirements.

INSPECTION

This section shall describe how the Contractor will assure that the specified quality has been achieved. The Contractor's program is not related to any inspection carried out by the Engineer. The Contractor is to describe the system used to assure that the necessary quality is achieved by a system of checks, inspections, or

surveillance, or a combination of such methods, to assure that departures from requirements will be prevented or detected in a timely manner. The Contractor shall describe the methods used to document these activities. Forms are provided at the end of this Exhibit for the Contractor's use. The Contractor may use their own forms, however, they must contain the information provided on the attached forms.

NON-CONFORMANCES

This section shall describe the methods to be used when any item is found not to meet specifications and the means to be implemented to document the items and provide resolution, such as rework, repair, or use-as-is. The provisions for the Engineer's participation in such resolution, when disposition decisions are beyond the competence or authority of the Contractor shall be included.

RECORDS

This section shall describe how the various records generated by the Contractor are originated and maintained, received, filed, protected and authenticated. Quality Records required for submittal to the Engineer shall be described

HIGH STRENGTH BOLTING CHECKLIST
ROTATIONAL CAPACITY TEST

DATE: _____

DATE OF TEST _____ CONTRACTOR _____

CONTRACT NO. _____ PAY ACTIVITY _____

SUBMITTAL _____ TEST NO. _____

ITEM TESTED

SIZE AND DESCRIPTION	MFG.	MARKING	LOT NO.	FINISH
BOLT				
NUT				
WASHER				

ROTATIONAL CAPACITY LOT NUMBER:

TEST RESULTS

	RESULT TEST 1	RESULT TEST 2	PASS		FAIL	
MINIMUM TENSION REQUIRED						
TORQUE AT MINIMUM TENSION						
TENSION AFTER FULL ROTATION						

COMPUTED TORQUE VALUE: _____

TEST WAS CONDUCTED USING: G SKIDMORE SERIAL NO.:_____ CAL. DATE:_____
G SOLID PLATE

TORQUE WRENCH USED: SERIAL NO.: _____ CALIBRATION DATE:_____

DEGREE OF ROTATION:

REMARKS: _____

M **RCL TEST SHEETS FOR ALTERNATE DESIGNED FASTENER WILL BE FURNISHED UPON REQUEST**

_____ _____
CONTRACTOR REPRESENTATIVE DATE MBTA DATE

CONCRETE PLACEMENT CARD

DATE: CONTRACTOR: CONTRACT NO.

CONCRETE PLACEMENT NO: SCHEDULED PLACEMENT DATE:

STRUCTURE ELEVATION: FROM TO

ACTUAL PLACEMENT DATE: TIME: START: FINISH:

TYPE MIX: ESTIMATED QUANTITY-CY ACTUAL

PLACEMENT FOREMAN: MBTA INSPECTOR

CONTRACT DOCUMENTS:

REMARKS:

PREPLACEMENT CHECKS

ITEM	CONTRACTOR INSPECTOR	MBTA INSPECTOR	REMARKS
EXCAVATE AND SUBGRADE			
FORMS – LINE AND GRADE			
FORMS – BRACED, READY TO POUR			
RE-STEEL - QUANTITY/LOCATION/TYPE			
RE-STEEL - SECURE AND CLEAN			
WATER STOPS/SEALS, JOINT PREP.			
PIPE – QUANTITY-SECURE-ELEV.			
ELEC. CONDUIT-QTY-SECURE-ELEV.			
GROUND WIRE			
ANCHOR BOLTS & RODS/EMBED ITEMS			
FORMS HEATED IN COLD WEATHER			
COLD WEATHER CURING PRECAUTIONS			
CLEAN-UP INSIDE FORMS			
METHODS OF CURING			
SLURRY			
GUIDE WALLS IN TOLERANCE			
BENTONITE SLURRY TESTING			
OTHER (IDENTIFY)			
O.K. TO PLACE CONCRETE		MBTA INSP.	DATE:

EXPANSION/EPOXY EMBEDDED ANCHORS INSTALLATION AND INSPECTION REPORT

DATE: _____

CONTRACT NO.: CONTRACTOR:

ATTACHMENT LOCATION:

DRAWING/REV.:

SUBMITTAL:

PAY ACTIVITY:

TYPE, SIZE, NUMBER OF ANCHORS:

PREPLACEMENT CHECKS

INSPECTOR CHECKPOINTS	CONTRACTOR	DATE	MBTA	DATE
CONCRETE SURFACE				
ANCHOR HOLE LOCATION SURVEY AND MARKED				
EPOXY INJECTION SATISFACTORY				
TEMPERATURE RANGE SATISFACTORY				
TORQUE TEST				
ANCHORS INSTALLED CORRECTLY				

TEST WRENCH ID:_____ CALIBRATION DUE DATE: _____

REMARKS:

FIELD COATING INSPECTION REPORT

DATE:_____

CONTRACT NO.: CONTRACTOR:

LOCATION:

ITEM DESCRIPTION.:

COATING DATE: 1ST Q 2ND Q 3RD Q

AREA INSPECTED:

SUBMITTALS: DRAWING/REV.:

PAY ACTIVITY:

INSPECTIONS	CONTRACTOR	DATE	MBTA	DATE
SHELF LIFE/STORAGE TEMPS NOT EXCEEDED; UNOPENED ORIGINAL CONTAINERS WITH LABELS. BATCH NUMBER_____				
SURFACES TO BE COATED ARE CLEANED OF OIL, GREASE AND OTHER DETRIMENTAL MATERIAL				
TOUCH UP BARE OR ABRADED SURFACES WITH APPROVED COATING				
FIELD CONNECTIONS (WELD, BOLTING) SURFACES CLEANED AND PROFILED PRIOR TO PRIMER				
MATERIALS MIXED AND PREPARED TO MANUFACTURER=S RECOMMENDATIONS				
APPLICATION TO MANUFACTURER=S SPECIFICATIONS				
CURE TIME ACHIEVED PRIOR TO COATING				
COLOR AS SPECIFIED				
COATING THICKNESS (DFT) REQUIRED _____ ACTUAL _____				

ENVIRONMENTAL RECORD
SURFACE TEMP_____ HUMIDITY _____
AMBIENT TEMP_____ DEW POINT_____
SURFACE CONDITIONS
_____
WEATHER CONDITIONS
_____

REMARKS:

GROUTING INSPECTION REPORT

DATE:_____

CONTRACT NO.: CONTRACTOR:

LOCATION:

DRAWING/REV.: SUBMITTAL:

SUBMITTAL:

DESCRIPTION OF

GROUT TYPE/ID: PAY ACTIVITY:

INSPECTIONS	CONTRACTOR	DATE	MBTA	DATE
RELEASE OF ITEM FOR GROUT				
SURFACE PREPARATION COMPLETE				
SURFACE DAMP FOR REQUIRED TIME				
ALL VOIDS FILLED				
COLD WEATHER PROTECTION				
GROUT CURE COMPLETE Q MEMBRANE Q MOIST				
PRESSURE GROUT				

RELEASE OF ITEM FOR GROUT	
EXCESS WATER REMOVED	
TENDONS GROUTED WITHIN (15) DAYS OF STRESSING	

GROUT PUMPED CONTINUOUSLY UNTIL CONSISTENT AT UPPER VENT (A STEADY STREAM OF GOOD GROUT BEFORE CLOSING)
PRESSURE # _____ HOLD TIME _____ BEFORE CLOSING
REMARKS:

MATERIAL RECEIVING INSPECTION REPORT

CONTRACT NO.: CONTRACTOR:

DATE: REPORT NO.:

MATERIAL RECEIVED:

DESCRIPTION:					QUANTITY: SUBMITTAL NO.: ACTIVITY NO.: MANUFACTURER/SUPPLIER **RECEIVING INSPECTION REQUIREMENTS** REQUIREMENTS REQ=D REQ=D SAT UNSAT REQUIREMENTS SAT UNSAT N/A MATERIAL CERTIFICATION PHYSICAL CONDITION			
CERTIFICATE OF COMPLIANCE					PACKAGING			
SPECIAL TEST REPORTS					CLEANLINESS			
MANUALS					IDENTIFICATION/MARKINGS			
OWNER RELEASE FORM								

STORAGE AND MAINTENANCE REQUIREMENTS:

MATERIAL COMPLIES WITH CONTRACTURAL REQUIREMENTS: Q YES Q NO

COMMENTS:

CONTRACTOR REPRESENTATIVE DATE:

MBTA REPRESENTATIVE DATE:

POST TENSIONING INSPECTION REPORT

DATE_____

CONTRACT NO.: CONTRACTOR:

DRAWING/REV.: SUBMITTALS:

IDENTIFICATION/DUCT NUMBER:

PAY ACTIVITY:

	INSPECTION	CONTRACTOR	DATE	SURVEY CONT	SURVEY MBTA	MBTA	DATE
PLACEMENT	ELEVATION OF DUCT						
	DUCT PROFILES SMOOTH & CORRECTLY SHAPED						
	DUCT JOINTS MATED & SEALED WITH DUCT TAPE						
	ALL HOLES IN DUCT REPAIRED						
	SECURED TO PREVENT DISPLACEMENT DURING CONCRETING						
	DRAINS INSTALLED AT LOW POINTS						
	VENTS INSTALLED AT HIGH POINTS						
	BEARING PLATES SECURELY ATTACHED, ELEVATIONS & CONFIGURATION						
TENSIONING	ANCHOR HEADS FREE FROM CORROSION						
	WEDGES FREE OF RUST & STEEL SHAVINGS						
	PRESTRESSING STEEL FREE FROM CORROSION AND PROTECTED						
	EACH DUCT HAS THE SAME HEAT/REEL NUMBER INSTALLED						
	TENDONS STRESSED SLOWLY- ☐ ONE END ☐ BOTH						
	WEDGES SEATED EVENLY						
	TAILS CUT BY SAW						
	EQUIPMENT ID_____						
	_____						
	HEAT/REEL #_____						
	ELONGATED MARK INITIAL_____ FINAL_____						
	FINAL ELONGATION REQUIRED ACTUAL REQUIREMENT_____ ____5% MAX DIFF						
	Final Tension						
REMARKS:							

STRUCTURAL STEEL INSPECTION REPORT

DATE:_____

CONTRACT NO.: CONTRACTOR:

STRUCTURE.: WELDING CODE:

DRAWING/REV.: PAY ACTIVITY:

SUBMITTAL:

AREA/LOCATION/ELEVATION/GRID/BAY/C

CONFIGURATION	ITEM	INSPECTION	CONTRACTOR	DATE	SURVEY		MBTA	DATE
					CONT	MBTA		
	1.	ANCHOR BOLTS						
	2.	BASEPLATE ELEVATION & BEARING						
	3.	BRIDGE BEARING TYPE & LOCATION						
	4.	COLUMNS/BENTS						
	5.	BEAMS/GIRDERS						
	6.	EXPANSION JOINTS						
	7.	STIFFENERS						
	8.	DECK INSTALLATION						
	9.	HIGH STRENGTH BOLTING						
	10.	EXPANSION ANCHORS						
	11.	WELD INSPECTION COMPLETE						
	12.	FINAL ELEVATION TOP OF STEEL						

REMARK

:

END OF SECTION

SECTION 01500

CONSTRUCTION TEMPORARY FACILITIES AND TEMPORARY CONTROLS

1.01 DESCRIPTION

A. This Section specifies the general requirements for furnishing, installing, and operating construction temporary facilities and temporary controls during construction, in accordance with Standard Specifications Division 1 - General Requirements Section 01500, except as modified herein.

1.02 TEMPORARY FACILITIES AND SERVICES DURING CONSTRUCTION

A. During progress of the Work, provide all temporary facilities and services not limited to, the following:

2. Light and Power;

f. No light or power services shall be connected to the Authority's power service by the Contractor or by any utility company without approval and written permission of the Authority. The Contractor shall coordinate with Boston Edison for temporary electrical service and shall bear all associated costs.

5. Provide two parking spaces for MBTA Operations Personnel in a parking lot or garage within 300 yards of the Work for the duration of the Contract. The location of the parking spaces shall be submitted to the Engineer for approval.

6. Temporary Protected Pedestrian Walkway: Provide a temporary protected pedestrian walkway as indicated on the Drawings. Pedestrian walkway shall be kept in clean, neat, and graffiti-free condition throughout the length of the Contract, to the satisfaction of the Engineer.

7. Arrange for Telephone Service for the temporary facility and provide necessary conduit and cable to nearest Verizon Demarcation. Include all telephone equipment and devices.

B. Quality Assurance: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

C. Standards: Comply with NFPA Code 241 "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEMA, NECA, and UL Standards and Regulations for temporary electrical service. Install service in compliance with National Electric Code (NFPA 70).

1.04 PUBLIC SAFETY AND CONVENIENCE

A. The Contractor shall comply with all applicable laws, ordinances, rules, and regulations regarding the safety of persons or property or with regard to protecting them from damage, injury, or loss and shall not load or permit any part of the work to be placed so as to endanger the safety of the work. All methods and precautions for the public safety and convenience shall be subject to approval of the Engineer during the progress of the work.

1.05 MATERIALS

A. General: Provide new materials for temporary partitions. Provide materials as specified below, or if not specified, suitable for the use intended, as determined by the Engineer.

B. Lumber and Plywood: Provide lumber and plywood which complies with requirements specified in Section 06100 - ROUGH CARPENTRY of these specifications, and as follows:

1. For sheathing of temporary partitions and pedestrian walkways, provide 1/2 in. Exterior Grade MDO plywood.

2. Miscellaneous Framing and Blocking Lumber: Provide lumber of sizes, stress ratings, and species, as required for intended use.

C. Metal Studs and Framing: Provide metal support system materials which comply with requirements specified in Section 09100 - METAL SUPPORT SYSTEMS of these specifications.

D. Drywall: Provide finished drywall surfaces that conform to the requirements specified under Section 09250, GYPSUM WALLBOARD.

E. Painting: Provide paint materials as specified in Section 09900, PAINTING.

F. Signage: Provide signage as specified in Section 10440, SIGNAGE AND GRAPHICS.

G. Insulation: Provide batt insulation as specified in Section 07210, BUILDING INSULATION.

H. Doors: Provide solid core wood doors as follows: General: AWI PC-5 construction as specified in AWI Quality Standards Section 1300-G-3. Core, stiles, and rails shall be glued together before sanding. Wood for stiles and rails shall be thoroughly seasoned, kiln-dried stock with 5% to 8% moisture content.

1. Core for non-fire-rated doors shall be 28 to 32 lb./cu. ft., Grade 1-L-1 particleboard conforming to ANSI A208.1, consisting of wood particles bonded together with synthetic resins, except as specified otherwise.

2. Crossbands shall be 1/16 in. thick hardwood, full width of door, with grain at right angle to face veneer grain.

3. Veneers shall be at least 1/50 in. thick medium density overlay phenolic resin impregnated cellulose fiber sheet, bonded to 1/16 in. hardwood crossband backing, and adhered to core, rail and stile by hot-press method, suitable for painted finish as specified in Section 09900, PAINTING.

I. Hardware: Provide hardware for each temporary door, as specified in Section 08710, FINISH HARDWARE.

J. Chain Link Fencing: Provide chain link fencing for temporary pedestrian walkways, and other temporary locations in conformance with Section 02444, CHAIN-LINK FENCE AND GATES.

1.06 GENERAL

A. Install temporary partitions and booths in accordance with requirements specified in various specification sections referenced by this section, and as indicated on Drawings.

1.07 SUBMITTALS

A. Submit bi-weekly progress reports to the Engineer on all permitting issues, as they pertain to this Project.

1.08 MEASUREMENT AND PAYMENT

A. No separate measurement and payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

-END OF SECTION-

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

1.01 DESCRIPTION

A. This section specifies mobilization and demobilization involving, but not limited to, the work within the MBTA Blue Line Maverick Station, Maverick Square, and Lewis Mall.

1.02 GENERAL

A. Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, for the establishment of all contractor's field offices, buildings, and other facilities necessary for work on the project and all other work and operations which must be performed or for costs which must be incurred prior to beginning work.

B. Demobilization shall consist of final site cleanup including, but not limited to, removal of all rubbish, waste, tools, foreign material, equipment and apparatuses caused by and used in the execution of the contract, flushing all drain lines on MBTA and City property, ensuring all surface catch basins in the vicinity of the site are free of debris, leaving the site clean, free of debris and in proper condition.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01300, except as modified herein.

B. Submit working drawings indicating the location of proposed construction work zones on permanent and, or temporary MBTA property. Limitations of MBTA work areas to be clarified by MBTA.

1.04 MEASUREMENT AND PAYMENT

A. Measurement

1. The work required by this Section will be measured on a lump sum basis.

B. Payment

1. The work required by this Section will be paid for at the Contract Lump Sum Price for Mobilization and Demobilize, Payment Item No. 0170.505.

2. The basis of payment for the payment item will be as follows:

a. The first payment of one-fourth (1/4) of the Contract Lump Sum Price for Mobilize and Demobilize will be made on the application for payment following the Engineers acceptance of both the Contractor's Baseline CPM Construction Schedule and the Contractor's project specific safety schedule.

b. The second payment of one-fourth (1/4) of the Contract Lump Sum Price for Mobilize and Demobilize will be made following the completion of the project construction activities that total 10% of the total Base Contract price.

c. The third payment of one-fourth (1/4) of the Contract Lump Sum Price for Mobilize and Demobilize will be made following the completion of the project construction activities that

total 15% of the total Base Contract price.

d. The final payment of one-fourth (1/4) of the Contract Lump Sum Price for Mobilize and Demobilize will accompany the Final Application for Payment.

C. Payment Items

Item No.	Description	Unit
0170.505	MOBILIZE AND DEMOBILIZE	LS

END OF SECTION

SECTION 01520

PROCEDURE FOR WORK VEHICLES

1.01 DESCRIPTION

A. This Section specifies work procedure flagging requirements, and requirements for work vehicles for operation on running rails.

1.02 WORK VEHICLE PROCUREMENT

A. Provide work vehicles required for the performance of this Contract. Work vehicles will not be provided by the Authority.

1.03 WORK PROCEDURE

A. Generally, revenue service ceases by approximately 1:15 a.m. and commences at 4:45 a.m. if there are no problems. Therefore, where there could be utilizing or fouling of the tracks, the working hours of this Contract shall be considered to be approximately 1:30 a.m. until 4:30 a.m. Clearance for work vehicles shall be considered.

B. Request access to the tracks each day access is required. All requests for track access shall reach the Engineer before 10:00 a.m. on the normal work day preceding the day access is required. The Engineer will confirm granting of requests for access. If notice of denial of access is issued prior to 2:00 p.m. on the day preceding the access, the work shall be postponed and not counted as one of the denials allowed under the contract.

1.04 FLAGMEN REQUIREMENTS

A. Work performed during revenue hours adjacent to the track (which could involve utilizing or fouling the tracks) requires blue uniform MBTA flagmen.

B. Work performed during non-revenue hours requires flag protection by the Track Department, not the Operation Department.

C. Requests for flagmen shall reach the Engineer before 10:00 a.m. on the normal work day preceding the day the flagmen are required.

1.05 HI-RAIL EQUIPMENT

A. Hi-Rail equipment is utilized to operate on running rails, adhere to the following:

1. All contractor Hi-Rail equipment working on MBTA tracks must be inspected by a competent person and that person will certify that the vehicle is safe to operate and will fit the geometry of the track it will be operating over.

2. The equipment shall pass a test run in the areas it will utilize to the satisfaction of the Engineer (Operating Department) before it can be used for work. Subsequent to passing required tests the equipment shall receive certification. Only certified equipment shall be allowed to operate under this Contract.

3. Operate equipment after the last subway train has cleared, including any Authority work train, if applicable.

4. Operate two units of equipment, self-propelled, in case one unit becomes disabled and has to be towed clear before revenue operation time to avoid any delays to the passenger train operation. Both units shall be accompanied with separate portable radios.

5. Clear operating rails by 4:30 a.m. or as otherwise directed by the night orders and/or MBTA Dispatcher.

6. Each separate piece of Hi-Rail, self-propelled equipment shall have a blue uniformed motorman assigned to it.

7. Vehicle shall carry equipment to re-rail the unit in the event the vehicle derails. This is to eliminate delays to Operations.

B. The Hi-Rail equipment shall be driven by a diesel engine. This engine has a higher flash point fuel and emits lower amounts of carbon monoxide than a gasoline engine. The fuel tank shall be of standard construction, sized for the type of vehicle and securely mounted. Fuel shall be #1 or #2 fuel oil with a flash point near 120 deg. F. Fuel piping and connections shall be made up to prevent oil or vapor leaks. The engine shall be maintained to prevent excessive exhaust emission and shall not be idled within the subway, preventing air contamination. No refueling shall be done within a subway section.

C. Equipment on Hi-Rail vehicle shall include adjustable flanged wheels which can be engaged with standard "T" track. These wheels shall be capable of being mechanically locked in the rail operating position to prevent inadvertent retraction during travel.

D. Hi-Rail equipment can be successfully operated at moderate speeds on main line tracks and at reduced speeds over turns, switches, and crossovers. Request from the Authority maximum operating speeds for the line the work is assigned. These maximum operating speeds shall be furnished to the vehicle operator and a "T" representative for guidance and enforcement.

E. Provide a fire extinguisher on the Hi-Rail Vehicle, as required for safety. Fuel and equipment shall be stored outside the subway and provisions made for proper ventilation.

F. One motorman (Authority personnel) will accompany each Hi-Rail vehicle piece of equipment in its moves at no additional cost to the Authority.

1.06 SAFETY

A. As a requirement of this Contract at any place of work, whether in the Right-of-Way or surface work and during the non-daylight hours, provide a minimum of two lighted red lanterns set out on the tracks to protect the work area. These lanterns shall be maintained in good operating condition throughout the length of the job. A copy of the MBTA handbook, "Hand, Flag, Lantern, and Safety Care Signal Safety Rules" (Latest Edition) is available for guidance.

B. Explosive materials, including, but not limited to propane and gasoline tanks, will not be allowed in the stations during revenue hours.

1.07 RADIOS

A. As a requirement of this Contract, provide six (6) multi-channel UHF two-way portable radios, Model Motorola HT750, complete with charger, spare battery, carry case/belt clip, speaker/microphones, and programming cables and software. These radios shall accompany each piece of Hi-Rail equipment, various splintered work parties during work in or adjacent to the station that could affect operations, and the Engineer. Maintenance of radios shall be the responsibility of this Contract for the duration. The

Authority will assign portable Engrave and user call numbers. Provide replacement radios for those out of maintenance. Authority will retain radios upon completion of the Contract.

1.08 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. Costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

SECTION 01545

PROTECTION OF WORK AND PROPERTY

1.01 DESCRIPTION

A. This Section specifies protection of work and property in accordance with Standard Specifications Division 1 - General Requirements Section 01545, except as modified herein.

B. If, during the carrying out of the Work covered by this Contract, the tracks or other facilities of the Authority are endangered, the Contractor shall immediately do such work as directed by the Authority to restore safety, and upon failure of the Contractor to carry out such directions immediately, the Authority may take whatever steps as are necessary to restore safe conditions.

1. The cost to the Authority of restoring safe conditions or of any damage to the Authority's trains, tracks, or other facilities caused by the Contractor's or subcontractors' operations will be considered a charge against the Contractor and shall be paid for by him, or may be deducted from monies due or that may become due him under the Contract.

C. Refer to Section 02200 Earthwork for requirements concerning recharging of ground water recharging requirements.

1.02 TEMPORARY PROTECTION

A. Protect:

4. All components of MBTA transit operations wherever exposed to potential damage of any feasible kind including but not limited to trackbed, third rail, track and switches, supports, and signal system. Particular care must be taken not to allow dirt, sand, debris or other foreign material to accumulate on or be mixed with the trackbed ballast.

5. All public rights of way and area utilities wherever exposed to potential damage of any feasible kind. Temporary protection shall be constructed and maintained. Contractor shall submit shop drawings to the Engineer for review and approval before commencing work.

D. Maintenance of Existing Drainage and Utilities:

1. During the proposed work, the Contractor shall maintain the flow of storm drainage, sanitary sewage and natural flows through the working areas. The Contractor is solely responsible for providing his flow control system and no separate payment will be made for the required work. The Contractor shall be responsible to the property owners affected by flooding or sanitary backup. The Contractor shall make such provisions as may be required by the local, state or

federal health officers or any other public bodies with jurisdiction over the flow of storm drainage, sanitary seepage and natural flows.

2. The Contractor shall furnish all necessary labor equipment and incidentals, take all necessary precautions in the handling of sewage, seepage, storm, groundwater, surface and flood flows which may be encountered at any time during the work. The manner of providing for these flows shall meet the approval of the Engineer. The Contractor shall submit a drainage plan that is acceptable to the Engineer and the City of Boston as applicable, describing the method for removal of surface drainage off-site.

3. The Contractor shall employ such feasible and practical methods in his operations as will prevent pollution, sedimentation or the introduction of impurities or other objectionable materials that may become suspended or dissolved in waters reaching streams, ponds.

1.03 ACCESS TO AUTHORITY PROPERTY

A. The Contractor shall notify the office of the Director of Design & Construction at 617-222-3117 and the office of the Blue Line Superintendent seventy-two hours prior to actual entry upon the property. The Contractor shall notify the office of the Director of Design & Construction and the Blue Line Superintendent, immediately, if the job is to be closed down for a period of more than three (3) consecutive days and shall again notify the Authority as specified when the Work will commence.

B. The contractor shall make all necessary arrangements with the Authority before entering upon the property and perform work in accordance with an approved work schedule. The contractor shall execute an agreement with the authority and shall have on the jobsite or produce evidence thereof, within a reasonable time, such signed documents or letters of approval permitting entry for work on Authority property. Absence of such documents or letters shall cause the Authority to order the Contractor to cease all activities and remove from the property all work forces and all equipment which would obstruct or endanger the safe operation of the transit system. Continuation of the work by the Owner or the Contractor will not be allowed until such documents or letters are made available to the Director of Design & Construction or an authorized representative.

C. Prior to authority support services (i.e., flagmen, hirail, operations supervisor, power linemen, signal maintainer, and submittal review) being provided for the project, the contractor must have in place a method of reimbursement to the Authority for all costs incurred. This will constitute an agreement to pay all support service charges through either an established force account or through direct billing.

D. The Work associated with this Project, except as specified, will be done without interruption of or change in the regular work schedule or operation of vehicles of the Authority. No work shall be done affecting the operation of vehicles or operation of stations until the Contractor has submitted details of his procedures to the Director of Design & Construction and the Chief of Blue Line Operations 30 working days prior to the start of work and has secured written permission to proceed.

E. The Authority reserves the right to require work affecting the safety of its operations to be performed at prescheduled non-operating periods from approximately 1:30 AM to 5:00 AM Monday - Thursday (1:30 AM to 4:30 AM effective); 2:30 AM to 6:00

AM Friday - Sunday (2:30 AM to 5:30 AM effective). The Contractor will not be permitted to remain within the track right-of-way after 4:30 AM (5:30 AM Sunday). The Authority may, during emergencies or at times when the Authority work forces are required to work in the area of the Contractor's work, order the Contractor to cease work and remove his work forces and equipment from the property leaving the right-of-way in a safe operating condition. The Authority also reserves the right to stop or postpone the Contractor's or subcontractor's previously approved work during operating hours if, in the Authority's opinion, such work is being performed in a manner that will endanger the Authority's operations.

F. The Contractor shall have his own provisions for power, air line and disposal of seepage water. No use of existing Authority utilities including its drainage system will be permitted unless approved by the Authority.

G. The Authority reserves the right to deny the Contractor and subcontractors access to the right-of-way because of operational requirements, adverse weather conditions or emergency track repairs. The Contractor shall reasonably expect to be denied access to the site a total of ten (10) days per calendar year. Each delay will be 60 minutes or less. Allowances shall be made for these possible events in the Bid.

H. The Contractor shall perform contract work at all times so as to cause no interruption of service during operating hours. The Contractor shall at all times after performing working during either operating hours or non-operating hours leave the Authority's property in a clean and safe operating condition.

I. On occasion, the Authority will operate work cars in the area of the work. At no time during these occurrences will the Contractor be allowed to work, except with the approval of the Authority or the Authority personnel providing protection services as specified.

1.04 PROTECTION SERVICES

A. When work is being performed in the vicinity of Authority rights-of-way and public areas by the contractor, the Authority will require the Owner or Contractor to have at the work site such authorized and staffed with qualified personnel as may be required to adequately protect the Authority's customers, employees, property, facilities and operations from hazardous conditions.

B. The Authority's Director of Design & Construction and/or the Chief of Blue Line Operations or their authorized representative shall determine when protection services are required. When the Authority determines that protection services are required, flagging personnel or any other such personnel as may be required to ensure the safety of the Authority's operations shall be provided from the Authority's work force in such numbers as the Authority determines. No work will be allowed if flagman are required, but not on duty.

1. The Contractor will be reimbursed by the Authority for the cost of protection services charged by the Authority for flagging personnel or any other such personnel as may be required to ensure the safety of the Authority's operations.

C. When it is determined that protection services are required, the Contractor shall notify the Authority 24 hours in advance and before 10:00 AM on the workday

preceding the day that protection services will be required. Requests for protection services on Saturday, Sunday and/or a holiday shall be made the preceding Friday before 10:00 AM or before 10:00 AM on the workday preceding the holiday. Requests for protection services hall be directed to:

For Non-Operating hours 1:30 AM - 5:00 AM, 2:30 AM - 5:00 AM
James J. Donovan
Planning and Scheduling Coordinator
Maintenance of Way
(617) 222-5419

For Operating hours 5:00 AM - 1:30 AM
Blue Line Superintendent
617-222-5532

It will be the sole discretion of the authority whether the contractor will be allowed to perform work on any particular day or night.

D. All workers employed by the Contractor who are to work within the Authority's stations, track area, right-of-way or adjacent to the power traction system or any high voltage electrical cables, shall be required to attend a four (4) hour safety awareness course at the Authority's Safety School. The location and time of such school will be at the sole discretion of the Authority's Safety Department. The intent of this course is to make the Contractor's personnel aware of the particular hazards related to the Authority's operations. The cost of the training is $25.00 per person and must be paid for by the contractor.

E. All personnel working in the immediate vicinity of, or within the right-of-way are required to wear orange safety vests similar to standard Authority equipment. In addition, the Contractor's personnel or groups of personnel, working within the right-of-way or the platform within 8 feet of the edge of the platform will require the presence of an Authority flagperson on duty at all times.

F. The Contractor shall not, at any time, operate equipment or machinery over Authority rights-of-way without the use of hi rail gear. All equipment that the Contractor proposes to operate shall be modified to operate over the Authority's tracks and special work including, but not limited to, switches, crossover frogs and restraining rail. The movement of all hi rail equipment will be controlled by Authority personnel at all time while operating on the Authority right-of-way. The Contractor shall supply a portable radio for each hi rail vehicle entering the Authority's right-of-way. No hi rail equipment will be allowed on Authority property without a functioning Authority frequency portable radio.

G. The Contractor shall furnish hi rail equipment capable of operating within the strict confines of the right-of-way. No Authority owned equipment is available for the Contractor's use. In addition to equipment necessary to complete the work on a regular basis, the Contractor shall be required to have on site sufficient standby equipment capable of removing disabled equipment from the right-of-way, and replacing disabled equipment in order to return the right-of-way to normal operating status by the end of the designated work period. As part of the prequalification statement, the Contractor shall furnish an itemized list of all equipment to be used on the project, including:

1. Type of equipment including, but not limited to, pickup, flatbed, excavator, crane, or dump trucks.
2. Make, model and date of manufacturer.
3. Ownership.
4. Present use and date of availability.
5. Location where equipment may be inspected by Authority personnel during the prequalification period.

G. Operators of such equipment may be examined by the Authority's representative to determine their fitness. If it is determined that they are unfit to work, then the Contractor shall prohibit them from operating the equipment.

I. All equipment when used in tunnels and/or darkness shall conform to the Authority's standards for headlights and marker lights. In addition, when vehicles are operating in tandem including, but not limited to, rail carts and flat cars, such vehicles shall be equipped with a flashing/strobe light when the lead vehicle is other than the operating vehicle. Diesel powered equipment only will be allowed in the tunnel and shall be removed from the tunnel each night unless otherwise permitted by the Director of Design and Construction.

J. Work activities necessitating the traction power system, third rail and catenary, de-energization will require the services of an Authority power lineman on site at all times.

K. Prior to the implementation of the contracted work, the Contractor will be required to supply professionally rendered signs, as directed by the Authority's Marketing Department. These signs will include, but not limited to the following:

1. Informational signs and/or leaflets for revenue service interruptions.
2. Platform, stairway and exit closing signs.
3. General project informational signs for Authority customers.

L. Upon the direction of the Authority's Director of Design and Construction and/or Chief of Blue Line Operations, the Contractor shall supply partitions and wooden barricades to cordon off the work site. The partitions and barricades shall be maintained and remain graffiti free by the Contractor for the duration of the project.

M. Upon direction from the Authority's Director of Design and Construction and/or Chief of Blue Line Operations, the Contractor shall supply the following when site conditions warrant:

1. Emergency and temporary lighting.
2. Exhaust fans of sufficient size and numbers to adequately ventilate the work site, and/or adjacent stations.
3. Fire and/or garden hose for the purpose of dust control.

N. It shall be the responsibility of the Owner or the Contractor to keep the Authority informed as to the times when the Contractor intends to perform hazardous work. Failure of the Contractor to provide the Authority with suitable advance notice of hazardous work will result in the stoppage of the work by the Authority until such time as sufficient numbers of protection personnel are on duty at the site.

1.06 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for the work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

- END OF SECTION -

SECTION 01550

HOT WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies "Hot Work" fire control procedures for contractors and their personnel, including cutters, welders and operators of heating equipment. Hot work is any work that utilizes or produces an ignition source.

1.02 JOB CONDITIONS

A. Perform "Hot Work" operations as follows:

1. Ensure the safe handling of "Hot Work" equipment and the safe use of the particular "Hot Work" process.

2. Determine the combustible materials and hazardous areas present or likely to be present in the work locations.

3. Protect combustibles from ignition by the following:

   a. Have work moved to a location free from dangerous combustibles.

   b. If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustible properly shielded against ignition.

   c. See that "Hot Work" is so scheduled that any operation which might expose combustibles to ignition is not started during the "Hot Work".

4. Give notice to the project office of the need to perform "Hot Work" operations and secure authorization from the Engineer.

5. Ensure that the cutter or welder secures his or her supervisor's approval that conditions are safe before going ahead with the work.

6. Ensure that fire protection and extinguishing equipment are properly located at the site.

7. Where fire watchers are required, see that they are available at the site.

8. Shall not use the signal rail system of a single rail track circuit as a negative return.

9. Procure all required permits as per Section 00700, Articles 5.01 and 5.02.

B. Ensure the worker handles the "Hot Work" equipment safely and uses it so as not to endanger lives or property and:

1. has the approval of his or her supervisor and the MBTA project office before starting any "Hot Work";

2. does not perform any "Hot Work" where conditions are not safe;

3. continues to perform "Hot Work" only so long as conditions are unchanged from those under which approval was granted.

1.03 FIRE PREVENTION PRECAUTIONS

A. Permit "Hot Work" only in areas that are or have been made firesafe. Within the confines of a building or other enclosed structure, perform cutting and welding operations preferably in a specific area designed or approved for such work, such as a maintenance shop or a detached outside location. Ensure that such areas are of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. When work cannot be moved practicably, as in most construction work, make the area firesafe by removing combustibles or protecting combustibles from ignition sources.

B. Do not permit "Hot Work" in the following situations:

1. In areas not authorized by the project office;

2. In sprinklered buildings while such protection is impaired;

3. In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts;

4. In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulphur, baled paper or cotton.

C. Before "Hot Work" is permitted, the Engineer will give notification authorizing the "Hot Work", and designate precautions to be followed. He will have designated MBTA personnel inspect the work area for fire safety, as indicated herein, and which personnel will complete a "Hot Work" checkoff list. The Engineer will also assure himself of the following:

1. The "Hot Work" equipment to be used is in satisfactory operating condition and in good repair.

2. Where there are combustible materials such as paper clippings, wood shavings or textile fibers on the floor, sweep the floor clean for a radius of 35 feet. Keep combustible floors wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, protect personnel operating arc welding or cutting equipment from possible shock.

3. Where practicable, relocate combustibles at least 35 feet from the work site. Where relocation is impracticable, protect combustibles with flame-proofed covers or otherwise shield with metal or fire-resistant guards or curtains. Secure edges of covers at the floor so they are tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile.

4. Tightly cover wall or floor openings or cracks within 35 feet of the site to prevent the passage of sparks to adjacent areas.

5. Suitably protect or shut down ducts and conveyor systems that might carry sparks to distant combustibles.

6. Where "Hot Work" is done near walls, partitions, ceilings or roofs, or combustible construction, provide fire-resistant shields or guards to prevent ignition. If welding is to be done on a metal wall, partition, ceiling or roof, take precautions to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, provide a fire watch on the opposite side of the work. Do not attempt welding on a metal partition, wall, ceiling or roof having a combustible covering, nor on walls or partitions of combustible sandwich-type panel construction.

7. Do not undertake to perform "Hot Work" on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs if the work is close enough to cause ignition by conduction.

8. Provide sufficient quantities of portable fire extinguishers, appropriate for the type of possible fire, at the work area. Where hose lines are available, connect them so they are ready for service.

9. Suitably protect nearby personnel against heat, sparks, slag, etc.

D. Require the services of Fire Watchers whenever "Hot Work" is performed in locations where other than a minor fire might develop, or where the following conditions exists:

1. Appreciable combustible material in the building construction or contents is closer than 35 feet to the point of operation.

2. Appreciable combustibles are more than 35 feet away, but are easily ignited by sparks.

3. Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

4. Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings or roofs, and are likely to be ignited by conduction or radiation.

Fire Watcher's responsibilities include:

1. Have fire extinguishing equipment readily available and be trained in its use.

2. Be familiar with facilities for sounding an alarm in the event of fire.

3. Watch for fires in exposed areas, and try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm.

4. Maintain a fire watch for at least one-half hour after completion of "Hot Work" operations to detect and extinguish possible smoldering fires.

E. Where a Fire Watch is not required, make a Final Check-Up one-half hour after the completion of "Hot Work" operations to detect and extinguish possible smoldering fires.

F. Have "hot tapping" operations or other cutting or welding on a flammable gas or liquid transmission or distribution utility pipeline performed only by a crew qualified to make hot taps.

1.04 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work required under this Section. Costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

1.01 DESCRIPTION

A. This Section specifies the general requirements for furnishing, installing, and operating temporary controls during construction in accordance with Standard Specifications Division 1 - General Requirements Section 01560 except as modified herein. .

1.03 LAWS TO BE OBSERVED

E. Energy policy and Conservation Act

1. Comply with mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 USC Section 6321 et. seq.).

F. Environmental Violations

1. Comply with the Massachusetts Department of Environmental Protection Regulations for Releases of Oil and Hazardous Materials and all other requirements of the Environmental Protection Agency regulations of the Clean Air Act and Clean Water Act and any other provisions of law, or amendments thereto including the laws or regulations of local municipalities.

2. All diesel construction equipment used in this contract shall have emission control device installed, such as oxidation catalysts or particulate filters on the exhaust system side of the diesel combustion engine equipment.

G. Wetlands Protection Act

1. Comply with the Attachment A – Work Conditions, Negative Determination of Applicability, Massachusetts Bay Transportation Authority, Maverick Station Blue Line Vent Shafts on page 01560-3

1.09 SITE SECURITY AND ACCESS

A. The Contractor shall prepare and submit to the Engineer for approval, a site specific security plan for the all phases of the Work. This plan shall be detailed to address all site security issues of the Work including all subcontractor efforts. The plan shall be maintained and updated as required throughout the Contract duration. The Contractor, Subcontractor, Vendors and Suppliers are required to comply with the approved site security plan at all times. The Contractor is required to provide identification badges for all employees including subcontractors. The badges must include personal photograph, name and employer and must be visible when worn at all times.

1.10 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for Work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain

END OF SECTION

Attachment A – Work Conditions, Negative Determination of Applicability
Massachusetts Bay Transportation Authority, Maverick Sta. Blue Line Vent Shafts

1. Any changes made or intended in the submitted plans shall require the applicant to inquire to the Commission in writing as to whether the changes warrant further formal Commission review. Any errors in the plans or information submitted by the applicant shall be considered changes. If at any time during the implementation of the project a fish kill or significant water quality problem occurs in the vicinity of the project, all site related activities impacting the water shall cease until the source of the problem is identified and adequate mitigating measures employed to the satisfaction of the Commission.

2. The applicant and contractor shall develop a spill management plan for any hazardous materials which may be employed during work in the buffer zone or over the water. Specifically, the applicant should prepare to effectively deal with spillage of fuel or hydraulic fluids from equipment. A quick-absorbent material, such as "Speedy Dry" or equivalent, will be stored in a dry readily available area, and used in the event petroleum based fluids are spilled or leaked. The spent material is then to be containerized and disposed of property. An emergency fuel boom or absorbent pads shall be readily available in case any such spill threatens the water resources.

3. The applicant shall clean the work area at the end of each workday to prevent wind deposition of fugitive dust and accumulation of debris in the buffer zone or in the water.

4. No equipment or unconsolidated material shall be stored in the buffer zone. Any equipment used in the resource area or buffer zone that uses fuel, oil and/or hydraulic fluid shall be inspected daily for leakage. Any equipment that requires repair shall be repaired outside of the resource area and the buffer zone. Any equipment that uses fuel, oil and/or hydraulic fluid shall be staffed at all times while operational within the resource area or buffer zone.

5. All unconsolidated, project-related materials shall be contained to prevent erosion into the water by using all practical precautions, including but not limited to placement of sand bags or double staked hay bales and a silt fence along the outer limits of the work area to prevent erosion of these materials into the resource area. Stockpiles shall be completely covered overnight, during rain events, and on weekends and other days when work does not occur at the site. These barriers shall be inspected on a daily basis and maintained as necessary including removal of accumulated sediments. Erosion containment materials or systems shall be removed after the site is stabilized and after any accumulated sediments are removed.

6. All disturbed areas shall be stabilized as soon as possible.

7. Vehicles leaving the site shall be thoroughly cleaned/washed to avoid tracking of material on to the public way.

8. The applicant shall ensure the cleanliness of all catch basins on or adjacent to the project property. Catch basins and drainage swales shall be protected with sandbags or hay bales and/ or silt sacks during the construction period.

SECTION 01561

CONSTRUCTION NOISE CONTROL

PART 1 – NOISE DESCRIPTION

1.01 GENERAL

A. The intent of this Section is to minimize construction noise in the residential areas adjacent to the construction site. To this end, the Contractor and all subcontractors, suppliers, and vendors, are required to comply with all applicable noise regulations, specification requirements, and the noise level limits specified herein.

B. This Section specifies requirements for Noise Control Plans, a Noise Monitoring Plan, baseline noise monitoring prior to construction, noise monitoring during construction, equipment noise testing, and response to community noise complaints. All requirements of this Section shall be overseen by an approved Acoustical Engineer employed by the Contractor.

C. The Contractor shall use equipment with efficient noise-suppression devices and employ other noise abatement measures such as enclosures and barriers necessary for the protection of the public. In addition, the Contractor shall schedule and conduct operations in a manner that will minimize, to the greatest extent feasible, the disturbance to the public in areas adjacent to the Work and to occupants of buildings in the vicinity of the Work.

D. Because of the proximity of the construction activity to the residents in the Lewis Mall area, a 16-foot high noise barrier is required to reduce construction noise levels at these receptors. The approximate location of this noise barrier is shown in Figure 2.

E. In no case shall the restrictions identified in this Section limit the Contractor's responsibility for compliance with all Federal, state, and local safety ordinances and regulations.

1.02 DEFINITIONS

A. Noise is any audible sound that has the potential to annoy or disturb humans, or to cause an adverse psychological or physiological effect on humans.

B. Daytime refers to the period from 7 AM to 6 PM local time daily, except Sundays and Federal holidays.

C. Evening refers to the period from 6 PM to 10 PM local time daily, except Sundays and Federal holidays.

D. Nighttime refers to the period from 10 PM to 7 AM local time daily, as well as all day Sunday and Federal holidays.

E. Noise-Sensitive Locations shall mean locations where particular sensitivities to noise exist, such as residential areas, institutions, hospitals, and parks.

F. Nuisance Noise refers to sound levels that annoy or disturb a reasonable person of normal sensitivities, but do not exceed the noise limits specified herein.

G. Lot-line refers to the line separating a parcel of land from another parcel or from the street.

H. Background Noise shall be defined as the measured ambient noise level associated with all existing environmental, transportation, and community noise sources in the absence of any audible construction activity.

I. dBA shall be defined as the sound level (in decibels referenced to 20 micro-pascals) as measured using the A-weighting network on a sound level meter, in accordance with ANSI S1.4 Standards.

J. Lmax shall be defined as the maximum measured sound level at any instant in time.

K. Leq shall be defined as the equivalent sound level, or the continuous sound level that represents the same sound energy as the varying sound levels, over a specified monitoring period.

L. L10 shall be defined as the sound level exceeded 10 percent of the time for a specified monitoring period.

M. Slow specifies a time constant or 1 second for the root-mean-square (RMS) detector used by a sound level meter, in accordance with ANSI S1.4 Standards.

N. Impact noise is noise produced from impact devices with discernible bursts of sound energy with each burst having a duration of less than approximately one-second. Examples for impact equipment include, but are not limited to; blasting, clam shovel or chisel drops, pavement breakers, jackhammers, hoe rams, mounted impact hammers, and impact pile drivers (but not vibratory pile drivers). Table 2 specifies types of equipment that are considered to emit impact or continuous noise.

1.03 SUBMITTALS

A. Submit the name, address, and qualifications of the Acoustical Engineer, as specified in Article 1.05 of this Section, for review and acceptance prior to preparing the Noise Control Plan.

B. Submit a Noise Monitoring Plan prior to construction, as specified in Article 1.06 of this Section, for review and acceptance within 30 days of the Notice to Proceed and prior to the start of any baseline noise monitoring.

C. Submit a current laboratory calibration conformance certificate for the noise monitoring equipment, as specified in Article 2.02 of this Section, prior to performing any noise level monitoring. Submit updated certificates following subsequent yearly calibrations, or upon completion of repairs to the instrument, for the duration of this Contract.

D. Submit a Noise Control Plan as specified in Article 1.07 of this Section, for review and acceptance within 60 days of the Notice to Proceed and prior to the start of any construction. The Noise Control Plan should be updated semi-annually or whenever the construction activities or work hours have changed.

E. Submit shop and working drawings, computations, and other data for Contractor supplied noise abatement measures identified in the Noise Control Plan.

F. Submit acoustical evaluation of noise mitigation measures for approval prior to construction.

G. Submit design drawings and specifications for any required noise mitigation measures.

H. Submit Monthly Noise Measurement Reports during construction as specified in Article 3.01 and 3.02 of this Section. The monthly reports shall include all noise level measurements taken during construction,

including a description of the construction activity, complaint response, and equipment certification measurements.

I. Submit Certificate of Equipment Noise Compliance Forms as specified in Article 3.05 for all on-site construction equipment. These certificates should be updated every six months.

J. Submit complaint response description and noise measurement results immediately to the Engineer as specified in Article 3.06 of the Section.

1.04 CONSTRUCTION NOISE LEVEL LIMITS

A. Lot-Line Construction Noise Levels

1. Construction activities shall be conducted in such a manner that the noise levels from these activities, as measured at the nearest lot line of the affected property, are in compliance with the City of Boston construction noise control regulations, and do not exceed the daytime, evening, and nighttime noise limits identified in Table 1.

2. The Contractor shall conduct monthly noise measurements at the lot line of the nearest impacted receptors to verify the Contractor's compliance with the noise limits specified in Table 1. The measurements will be of sufficient duration to be representative of the construction activities of concern.

3. In the event that any measurements indicate that the lot-line noise limits are exceeded, the Contractor shall promptly take appropriate actions to correct these violations. If it is not possible for the Contactor to immediately provide corrective actions that will achieve compliance with the noise limits, the Contractor shall notify the Authority immediately, and provide the Authority with a schedule to support the Contractor's noise abatement activities necessary to achieve compliance, and to commence such abatement activities immediately.

B. Construction Equipment Noise Limits

1. The Contractor shall use only equipment that, operating under full load, meets the noise limits specified in Table 2 when measured according to the test procedures specified in Article 3.05 of this section.

2. If the Contractor's existing equipment on site does not meet the noise emission limits specified in Table 2 or falls out of compliance, the Contractor shall remove the equipment promptly from service or take prompt remedial action to comply with these specifications.

C. Equipment Operations

1. The use of impact pile drivers shall be prohibited during evening and nighttime hours (i.e. 6 PM to 7 AM).

2. Vibratory sheet pile driving shall be prohibited during the nighttime period (i.e. 10 PM to 7 AM).

3. All jackhammers, chainsaws, and pavement breakers used on the construction site shall be enclosed with shields, acoustical barrier enclosures, or noise barriers.

4. Use of all impact devices, including hoe rams, jackhammers, chiseling devices, and pavement

breakers, shall be prohibited during the nighttime hours (i.e. 10 PM to 7 AM). Any necessary use of impact devices between 10 PM and 7 AM shall be reviewed by the Engineer in advance and allowed as an exception only upon sufficient justification.

5. Contractors shall use approved haul routes to minimize noise at residential and other sensitive noise receptor sites.

6. All equipment with back-up alarms operated by the Contractor, vendors, suppliers, and subcontractors on the construction site shall be equipped with either audible self-adjusting ambient-sensitive back-up alarms or manually adjustable alarms. The ambient-sensitive alarms shall automatically adjust to a maximum of 5 dBA over the surrounding background noise levels. The manually adjustable alarms shall be set at the lowest setting required to be audible above the surrounding noise. Installation and use of the alarms shall be consistent with the performance requirements of the current revisions of Society of Automotive Engineering (SAE) J994, J1446, and OSHA regulations.

7. Per State regulations, engine idling for trucks is limited to 5 minutes maximum.

1.05 ACOUSTICAL ENGINEER

A. The Acoustical Engineer identified in this Article shall oversee all requirements of this Section. These include the preparation and implementation of the Noise Monitoring Plan, Noise Control Plan, the equipment noise certifications, the Monthly Construction Noise Monitoring and Reports, and the complaint response noise monitoring.

B. The Acoustical Engineer shall have the following minimal qualifications:

1. Bachelor of Science or higher degree from a qualified program in engineering, physics, or architecture offered by an accredited university or college, and five years experience in noise control engineering and construction noise analysis; or current enrollment as a full Member or Board-certified Member in the Institute of Noise Control Engineering (INCE).

2. Demonstrated substantial and responsible experience in preparing and implementing construction noise controls and monitoring plans on construction projects conducted in an urban setting, calculating construction noise levels, and designing and overseeing the implementation of construction noise abatement measures.

C. If at any point, in the judgment of the Engineer, the quality of the Acoustical Engineer's submittals proves to be repeatedly unacceptable, then the Engineer can require the submittal and selection of an alternative Acoustical Engineer meeting the requirements in this Article.

1.06 NOISE MONITORING PLAN

A. The Noise Monitoring Plan describes the noise monitoring and reporting procedure to be used to establish the existing background noise levels and for noise monitoring during construction to show compliance with the City of Boston construction noise limits.

B. The Noise Monitoring Plan shall identify and describe the following in detail:

1. The receptor locations where noise monitoring will be performed. Include the locations shown in Figure 1 and others as appropriate to effectively monitor noise conditions during construction.

Include sketches of all locations.

2. The type of noise level measurement device that will be used, as specified in Article 2.02 of this Section.

3. The noise monitoring methods and procedures that will be used, as specified in Article 3.01 of this Section.

4. The data reporting method that will be used, as specified in Article 3.02 of this Section.

5. The response procedure and actions to be taken for any lot-line or equipment noise level that exceeds the noise limits specified in Article 1.04 of this Section. The response procedure may include, but not be limited to, the use of noise reduction materials and equipment listed in Article 2.03 and methods in Article 3.03.

6. The complaint response and resolution, as specified in Article 3.06 of this Section.

1.07 NOISE CONTROL PLAN

A. The Noise Control Plan describes the procedure for predicting construction noise levels prior to performing construction activities and describes the noise reduction measures required to meet the noise level limitations and minimize nuisance noise conditions. The Plan shall be prepared by and bear the signature of the Acoustical Engineer and shall be submitted to the Engineer as specified in paragraph 1.03.D. Noise generating equipment shall not be operated prior to acceptance of the Noise Control Plan. The Noise Control Plan is required no later than 60 Days after Notice-to-Proceed. An updated Noise Control Plan shall be resubmitted semi-annually or whenever the construction activities or the work hours have changed, as specified in paragraph 1.03.D.

B. The Plan shall include:

1. Any Contract-specific noise control commitments made previously by the Project as referenced in this Section.

2. A description of the anticipated construction activities.

3. An inventory of construction equipment and associated noise levels using Part A of the Noise Control Plan Form in Figure 3. The following information is required:

a. Column (a): Code to identify equipment for sketches and equipment certification procedures.
b. Column (b): Appropriate equipment category from Table 2.
c. Column (c): Equipment manufacturer and model.
d. Column (d): Unique identifier (ID), such as registration number.
e. Column (e): Horsepower rating of the equipment.
f. Column (f): Equipment noise emission limit from Table 2.
g. Column (g): Estimated noise level at 50 feet. If greater than the limit specified in Table 2, noise reduction measures will need to be included.
h. Column (h): Estimated date of first use on site.
i. Column (i): Estimated date of last use on site.
j. Column (j): Expected use; circle D for daytime, E for evening, N for nighttime use.

4. Noise Level Calculations

Perform calculations to predict lot-line construction noise during applicable daytime, evening, and nighttime periods. The calculations shall be made at each of the noise-sensitive receptor locations identified in Figure 1, where noise emitted by all applicable equipment will cause the greatest noise level for each type of land use for a given time period. The Contractor shall provide the results on Part B of the Noise Control Plan Form in Figure 4 with calculations included below the results, and with the locations for the calculations indicated on the site sketch. The noise level calculation procedure shall be as follows:

a. Calculate Lmax:

1. Calculate the maximum equipment noise level at the closest point on the lot-line for each item of equipment using the following equation:

$$Lmax(equipment) = E.L. - 20\ Log_{10}(D/50) - A_e$$

where:

E.L. is the estimated equipment noise emission level at 50 feet (Figure 2, column g or from Table 2 of this Section) in dBA.

D is the distance from the equipment to the closest point on the lot-line in feet, but shall not be less than 50 feet.

A_e is the site-specific excess attenuation due to barrier effects. The procedure used to estimate excess attenuation shall be identified.

2. Whereas the maximum noise level produced by each piece of equipment may not occur simultaneously, obtain the overall maximum construction noise level at the lot-line from the two loudest pieces of equipment to obtain the maximum noise level at each location as follows:

$$Lmax(overall) = 10\ Log_{10}\ \{10^{[(Lmax(equipment\ 1)/10)]} + 10^{[Lmax(equipment\ 2)/10]}\}$$

Where:

Lmax(equipment 1) is the maximum noise level for the noisiest piece of equipment, in dBA.

Lmax(equipment 2) is the maximum noise level for the second noisiest piece of equipment, in dBA.

b. Calculate Leq:

1. Calculate Leq at the closest point on the lot-line for each item of equipment using the following equation:

$$Leq(equipment) = E.L. - 20\ Log_{10}(D/50) + 10\ Log_{10}(UF) - A_e$$

where:

E.L. is the estimated equipment noise level at 50 feet, in dBA.

D is the distance from the equipment to the lot-line location, in feet.

UF is the "usage factor", and is used to time-average the noise levels associated with an operating piece of equipment. The UF is expressed as the fraction of time that the equipment is operated at full power while on site. This factor shall be estimated by the Contractor and/or the Acoustical Engineer. Guidelines for the selection of usage factors are provided by the U.S. Environmental Protection Agency ("Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances", U.S. Environmental Protection Agency Report NTID 300.1, December 31, 1971).

Ae is the site-specific excess attenuation due to barrier effects. The procedure used to estimate excess attenuation shall be identified.

2. Combine the individual contributions of each piece of equipment to obtain the overall construction Leq at the lot-line as follows:

$$Leq(overall) = 10\ Log_{10} \sum 10^{[Leq(equipment)/10]}$$

c. Calculate L10:

Finally, as supported by previous noise studies, calculate the estimated overall L10 by simply adding 3 dBA to the overall Leq as follows:

$$L10(overall) = Leq(overall) + 3\ dBA$$

5. Noise Level Limit Calculations

Perform calculations to determine L10 lot-line noise level limits during applicable daytime, evening, and nighttime periods. The calculations shall be made at each of the noise-sensitive receptor locations identified in Figure 1.

6. A sketch of the construction site indicating the following:

a. Contract name and number, Contractor's name, date, scale, legend of symbols, and direction of North.

b. Construction equipment locations, designated by codes used in Column (a) in Figure 3.

c. All noise receptor locations near the construction site, as specified in Figure 1.

d. Locations and types of noise reduction measures that may be required to demonstrate compliance with noise limits as specified in Article 1.04 of this Section.

7. A summary table listing the anticipated unmitigated and, if warranted, mitigated construction noise levels shall be provided for all the noise receptor locations shown in Figure 1. Each receptor's appropriate lot-line criteria limits (from Table 1) shall also be referenced in the table.

8. A description of noise reduction measures, if necessary, to meet the lot-line and equipment noise level limitations as specified in Tables 1 and 2. The noise reduction measures may include, but not be limited to, the noise reduction materials and equipment listed in Article 2.03 and noise reduction methods listed in Article 3.03 of this Section. If noise reduction measures are required, re-calculate the noise levels at the lot-line of the noise monitoring location using the anticipated noise reduction measures and submit the results in Figure 4.

9. Where excessive noise levels are anticipated, noise mitigation measures must be proposed. The beneficial noise reducing effects of the mitigation measures must be quantitatively predicted, and compliance with the specified noise limits in Table 1 must be demonstrated in the resulting predicted mitigated noise levels. Calculations for noise barrier performance design predictions shall use the path-length-difference method involving Fresnel numbers.

10. Any drawings, sketches and suitable calculations that demonstrate anticipated noise reduction benefits. Submit shop and working drawings, computations, materials data, and other descriptions as specified in paragraph 1.03.E.

1.08 EQUIPMENT NOISE CERTIFICATION

A. The construction equipment to be certified includes any equipment of the types listed in Table 2 brought on-site. Noise emission limits in Table 2 shall apply to Contractor and subcontractor equipment.

B. All construction equipment that meets the requirements described above shall be tested using the procedures specified in Article 3.05 of this Section to ensure compliance with equipment Lmax noise limits in Table 2. The equipment noise certification shall be overseen by the Acoustical Engineer and certificates shall be submitted to the Engineer as specified in paragraph 1.03.I.

C. Equipment shall be subject to periodic compliance testing whenever evidence of non-compliance is apparent. Testing shall be performed as described in Article 3.05 of this Section.

D. Equipment without a currently valid noise certification on file with the Engineer, or equipment that fails its random noise compliance test (i.e. exceeds the 50 ft emission limits in Table 2) shall be required to cease operation until adequate mitigation measures can be implemented.

PART 2 – NOISE MATERIALS

2.01 GENERAL

A. All equipment and materials specified in this part will remain the property of the Contractor or Contractor's subcontractors, vendors, and suppliers, as applicable.

2.02 NOISE MONITORING EQUIPMENT

A. All noise measurements shall be performed with an instrument that is in compliance with the criteria for a Type 1 (Precision) or Type 2 (General Purpose) Sound Level Meter as defined in the current revision of ANSI Standard S1.4.

B. The sound level meter shall be capable of measuring dBA noise levels and operating on the SLOW response setting.

C. Sound level meters shall be capable of measuring Lmax and L10 over 20 minute intervals in the field without the need for post-processing of data.

D. All sound level meters, microphones, and calibrators shall undergo certified laboratory calibration conformance testing at least once a year. The calibration certificate shall be submitted to the Engineer as specified in paragraph 1.03.C.

E. The sound level meter shall be on-site and readily accessible at all times.

2.03 NOISE REDUCTION MATERIALS AND EQUIPMENT

A. Noise reduction materials may be new or used. Used materials shall be of a quality and condition to perform their designed function.

B. Noise reduction equipment and materials may include, but not be limited to:

1. Shields, shrouds, or intake and exhaust mufflers.

2. Noise-deadening material to line hoppers, conveyor transfer points, storage bins, or chutes.

3. Noise barriers using materials consistent with the Temporary Noise Barrier materials specified in Article 2.04 of this Section.

C. All equipment with back-up alarms operated by the Contractor, vendors, suppliers, and subcontractors on the construction site shall be equipped with either audible self-adjusting ambient-sensitive back-up alarms or manually adjustable alarms. The ambient-sensitive alarms shall automatically adjust to a maximum of 5 dBA over the surrounding background noise levels. The manually adjustable alarms shall be set at the lowest setting required to be audible above the surrounding noise. Installation and use of the alarms shall be consistent with the performance requirements of the current revisions of Society of Automotive Engineering (SAE) J994, J1446, and OSHA regulations.

D. All equipment used on the construction site, including jackhammers and pavement breakers, shall have exhaust systems and mufflers that have been recommended by the manufacturer as having the lowest associated noise.

E. The local power grid shall be used wherever feasible to limit generator noise. No generators larger than 25 KVA shall be used and, where a generator is necessary, it shall have maximum noise muffling capability and meet the noise emission limits specified in Table 2.

2.04 TEMPORARY NOISE BARRIERS

A. Because of the proximity of the construction activity to the residents in the Lewis Mall area, a 16-foot high noise barrier is required to reduce construction noise levels at these receptors. The approximate location of this noise barrier is shown in Figure 2.

B. Temporary barriers shall be constructed of 3/4-inch Medium Density Overlay (MDO) plywood sheeting, or other material of equivalent utility and appearance having a surface weight of 2 pounds per square foot or greater. The temporary noise barriers shall have a Sound Transmission Class of STC-30, or greater, based on certified sound transmission loss data taken according to ASTM Test Method E90.

C. The temporary barriers shall be lined on one side with glass fiber, mineral wool, or other similar noise curtain type noise-absorbing material at least 2-inches thick and have a Noise Reduction Coefficient rating of NRC-0.85, or greater, based on certified sound absorption coefficient data taken according to ASTM Teat Method C423.

D. The materials used for temporary barriers shall be sufficient to last through the duration of the construction work for this Contract, and shall be maintained in good repair.

E. Construction Details

1. Barrier panels shall be attached to support frames designed to withstand 80-mph wind loads plus a 30 percent gust factor.

2 The barriers shall be installed such that the sound-absorptive surfaces face the Contractor's noise source construction equipment.

3. When barrier units are joined together, the mating surfaces of the barrier sides shall be flush with each other. Gaps between barrier units, and between the bottom edge of the barrier panels and the ground, shall be closed with material that will completely fill the gaps, and be dense enough to attenuate noise.

4. The barrier height shall be designed to break the line-of-sight and provide at least a 5-dBA insertion loss between the noise producing equipment and the upper-most story of the receptor(s) requiring noise mitigation. If for practicality or feasibility reasons, which are subject to the review and approval of the Engineer, a barrier cannot be built to provide noise relief to all stories, then it must be built to the tallest achievable height.

F. Prefabricated acoustic barriers are available from various vendors. An equivalent barrier design can be submitted as specified in Paragraph 1.03.G. in lieu of the plywood barrier described above.

2.05 ACOUSTICAL BARRIER ENCLOSURE

A. Materials

1. The acoustical barrier enclosure shall consist of durable, flexible composite material featuring a noise barrier layer bonded to sound-absorptive material on one side.

2. The noise barrier layer shall consist of rugged, impervious material with a surface weight of at least one pound per square foot. The sound absorptive material shall include a protective face and be securely attached to one side of the flexible barrier over the entire face.

3. The acoustical material used shall be weather and abuse resistant, and exhibit superior hanging and tear strength during construction. The material shall have a minimum breaking strength of 120 lb/in. per FTMS 191 A-M5102 and minimum tear strength of 30 lb/in. per ASTM D117. Based on the same test procedures, the absorptive material facing shall have a minimum breaking strength of 100 lb/in. and a minimum tear strength of 7 lb/in.

4. The acoustical material shall be corrosion resistant to most acids, mild alkalies, road salts, oils, and grease.

5. The acoustical material shall be fire retardant and be approved by the City of Boston Fire Department

prior to procurement. It shall also be mildew resistant, vermin proof, and non-hygroscopic.

6. The acoustical material shall have a Sound Transmission Class of STC-25 or greater, based on certified sound transmission loss data taken according to ASTM Test Method E90. It shall also have a Noise Reduction Coefficient rating of NRC-0.70 or greater, based on certified sound absorption coefficient data taken according to ASTM Test Method C423.

7. The Contractor shall submit the name of the manufacturer, properties of the material to be furnished, and two one-foot square samples to the Engineer for review prior to submittal of design and detailed engineering as specified in Paragraph 1.03.F.

B. Construction Details

1. The acoustical material shall be installed in vertical and horizontal segments with the vertical segments extending the full enclosure height. All seams and joints shall have a minimum overlap of 2 inches and be sealed using double grommets. Construction details shall be performed according to the manufacturer's recommendations.

2. The Contractor shall be responsible for the design, detailing, and adequacy of the framework and supports, ties, attachment methods, and other appurtenances required for the proper construction of the acoustical barrier enclosure.

3. The design and details for the acoustical noise barrier enclosure framework and supports shall be prepared and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts. The Contractor shall submit the design and detailed engineering drawings to the Engineer as specified in paragraph 1.03.G.

2.06 NOISE CONTROL CURTAINS

A. Materials

1. The noise control curtain shall consist of durable, flexible composite material featuring a noise barrier layer bonded to sound-absorptive material on one side. The noise barrier layer shall consist of a rugged, impervious material with a surface weight of at least one pound per square foot. The sound absorptive material shall include a protective face and be securely attached to one side of the flexible barrier over the entire face.

2. The noise curtain material used shall be weather and abuse resistant, and exhibit superior hanging and tear strength during construction. The curtain's noise barrier layer material shall have a minimum breaking strength of 120 lb/in. per FTMS 191 A-M5102 and minimum tear strength of 30 lb/in. per ASTM D117. Based on the same test procedures, the noise curtain absorptive material facing shall have a minimum breaking strength of 100 lb/in. and a minimum tear strength of 7 lb/in.

3. The noise curtain material shall be corrosion resistant to most acids, mild alkalies, road salts, oils, and grease. It also shall be mildew resistant, vermin proof, and non-hygroscopic.

4. The noise curtain material shall be fire retardant and be approved by the City of Boston Fire Department prior to procurement.

5. The noise control curtain shall have a Sound Transmission Class of STC-30 or greater, based on certified sound transmission loss data taken according to ASTM Test Method E90. It shall also have

a Noise Reduction Coefficient rating of NRC-0.85 or greater, based on certified sound absorption coefficient data taken according to ASTM Test Method C423.

6. The Contractor shall submit the name of the manufacturer, properties of the material to be furnished, and two one-foot square samples to the Engineer for review prior to submittal of the design and detailed engineering drawings as specified in paragraph 1.03.G.

B. Construction Details

1. The noise control curtains shall be secured above, at the ground, and at intermediate points by framework and supports designed to withstand 80 mph wind loads plus a 30 percent gust factor.

2. The curtains shall be installed in vertical and horizontal segments with the vertical segments extending the full curtain height to the ground. All seams and joints shall have a minimum overlap of 2 inches and be sealed using Velcro or double grommets spaced 12 inches on center. Curtains shall be fastened to framework and guardrails with wire cable 12 inches on center. Construction details shall be performed according to the manufacturer's recommendations.

3. The curtain height shall be designed to break the line-of-sight and provide at least a 5-dBA insertion loss between the noise producing equipment and the upper-most story of the receptor(s) requiring noise mitigation. If for practicality or feasibility reasons, which are subject to the review and approval of the Engineer, a curtain system cannot be built to provide noise relief to all stories, then it must be built to the tallest achievable height.

4. The Contractor shall be responsible for the design, detailing, and adequacy of the framework and supports, ties, attachment methods, and other appurtenances required for the proper installation of the noise control curtains.

5. The design and details for the noise control curtains framework and supports shall be prepared and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts. The Contractor shall submit the design and detailed engineering drawings to the Engineer as specified in paragraph 1.03.G.

PART 3 – NOISE MITIGATION

3.01 NOISE MONITORING METHODS

A. General

1. The sound level meter and the acoustic calibrator shall be calibrated and certified annually by the manufacturer or other independent certified acoustical laboratory. The sound level meter shall be field calibrated using an acoustic calibrator, according to the manufacturer's specifications, prior to and after each measurement.

2. All measurements shall be performed using the A-weighting network and the SLOW response of the sound level meter.

3. The measurement microphone shall be fitted with an appropriate windscreen, shall be located 5 feet above the ground, and shall be at least 5 feet away from the nearest acoustically-reflective surface.

4. Noise monitoring shall not be performed during precipitation or when wind speeds are greater than 15 mph, unless the microphone is protected in such a manner as to negate the acoustic effects of rain and high winds.

B. Background Noise Monitoring

1. Background noise measurements should be taken for at least 24 hours over two non-consecutive weekdays and one two-day weekend at noise monitoring receptor locations as specified in Figure 1, prior to the start of construction to establish baseline daytime, evening, and nighttime noise levels.

2. Background noise level data shall be reported for each one hour period and include the Lmax, Leq and L10 levels.

3. Determine the L10 noise level limits for the Monday through Saturday daytime, evening, and nighttime periods from Table 1 based on the measured background L10 noise levels for each time period.

4. Determine the L10 noise level limits for Sunday by adding 5 dBA to the measured Sunday background data for three time periods: midnight to 7 AM, 7 AM to 6 PM, and 6 PM to midnight.

5. The Lmax noise level limits are absolute limits from Table 1 and do not rely on background conditions.

C. Construction Noise Monitoring

1. Noise level measurements shall be taken at each of the noise-sensitive locations identified in Figure 1 during periods of maximum ongoing construction activities at least once each month during applicable daytime, evening, and nighttime periods.

2. The time period for each noise measurement shall be 20 minutes.

3. Construction noise measurements shall coincide with daytime periods of maximum noise-generating Construction activity, and shall be performed during the construction phase or activity that has the greatest potential to exceed noise level limitations as specified in Article 1.04 of this Section. Compliance noise measurements for the noise limits in Table 1 shall be performed at a point on a given lot-line that is the closest to the construction activity.

4. If, in the estimation of the person performing the measurements, outside sources contribute significantly to the measured noise level, the measurements shall be repeated with the same outside source contributions when construction is inactive to determine the background noise level contribution.

5. All measurements shall be taken at the affected lot-line. In situations where the work site is within 50 feet of a lot-line, the measurement shall be taken from a point along the lot-line such that a 50-foot distance is maintained between the sound level meter and the construction activity being monitored.

3.02 REPORTING

A. Background, construction and complaint response noise measurement data shall be recorded on the Noise Measurements Report Form provided in Figure 5. The type of measurement shall be noted on the form.

B. Provide a sketch or diagram for the exact location of the noise measurement on the back of Figure 5. Include the location and distance of the noise measurement in relationship to the noise monitoring locations specified in Figure 1.

C. During construction and complaint response monitoring, all construction equipment operating during the monitoring period shall be identified and the location sketched on the back of Figure 5. The sketch shall include the distance between the noise measurement location and the construction equipment.

D. All activities occurring while performing noise measurements shall be noted in the "Field Notes" area of Figure 5. In addition, any noise level of 85 dBA or greater requires an explanation.

3.03 NOISE REDUCTION METHODS

A. The Contractor shall use all reasonable efforts to implement noise reduction methods listed below to minimize construction noise emission levels. Noise reduction methods shall include, but not be limited to:

1. Use of local power grid to reduce the use of generators.

2. Attaching: 1) intake and exhaust mufflers, shields, or shrouds; 2) noise-deadening material to inside of hoppers, conveyor transfer points, or chutes.

3. Maintaining: 1) equipment mufflers and lubrication; 2) precast decking or plates; 3) surface irregularities on construction sites to prevent unnecessary noise.

4. Limiting: 1) the number and duration of equipment idling on the site; 2) the use of annunciators or public address systems; 3) the use of air or gasoline-driven hand tools.

5. Configuring, to the extent feasible: 1) the construction site in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations; 2) barrels or signage to detour traffic away from plated trenches.

6. Scheduling of construction events and limiting usage times to minimize noise, especially during nighttime hours and near sensitive abutters.

7. Constructing noise barriers and/or noise curtain systems.

8. Minimizing noise from the use of back-up alarms using measures that meet OSHA regulations. This includes use of self-adjusting ambient-sensitive backup alarms, manually adjustable alarms on low setting, use of observers, and scheduling of activities so that alarm noise is minimized.

9. Where practical and feasible, configuring construction sites to minimize back up alarm noise. For example, construction site access should be designed such that delivery and dump trucks move through the site in a forward manner without the need to back up.

10. Preventing nuisance noise conditions.

3.04 TEMPORARY NOISE BARRIERS

A. General

1. The Contractor shall erect temporary noise barriers to mitigate construction noise at locations specified in the Noise Control Plan or as directed by the Engineer.

2. The temporary noise barriers shall be readily moveable so that they may be re-positioned, as necessary, to provide noise abatement for non-stationary, as well as stationary, processes.

B. Installation, Maintenance, and Removal

1. The barriers shall be installed such that the noise-absorptive surfaces face the construction noise source.

2. The Contractor shall maintain the temporary noise barriers and repair all damage that occurs, including, but not limited to, keeping barriers clean and free from graffiti and maintaining structural integrity. Gaps, holes, and weaknesses in the barriers, and openings between or under the units, shall be repaired promptly or replaced by the Contractor with new material.

3. The Contractor shall remove and dispose of the temporary noise barriers at the end of the Contract or sooner at the direction of the Engineer.

3.05 EQUIPMENT NOISE CERTIFICATION

A. General

1. For each piece of equipment meeting the requirements of paragraph 1.08.A of this Section, complete an Application for Certificate of Equipment Noise Compliance (Figure 6), which shall be signed by the Acoustical Engineer.

2. The equipment identification number used for certification shall be consistent with the identification number used in the Noise Control Plan (Figure 3).

B. Test Procedures for construction Equipment

1. All engine-powered equipment shall be operated at high idle (maximum governed rpm) under full-load condition during the test.

2. Portable and mounted impact devices, such as hoe-rams and jackhammers, shall be tested during the first day of actual operation at the construction site under maximum load conditions as rated by the equipment manufacturer.

3. All noise monitoring equipment specified in Article 2.02 of this Section shall have a current certificate of calibration sticker affixed to it.

4. An acoustic calibrator of the type recommended by the sound level meter manufacturer shall be used prior to and after all measurements.

5. The noise level measurements shall be for a minimum period of 1 minute.

6. If possible, measurements shall be made at 50 feet from the front, rear, and right and left sides of the equipment, at a height of 5 feet above ground level.

7. Measurements made at less than 50 feet, due to space limitations at the test site, shall be reduced by

the values given in Table 3 to estimate the 50-foot noise level.

8. When noise level testing is requested by the Engineer for confirmation, the Contractor shall locate and operate the equipment as directed by the Engineer at the designated site so as to facilitate recording of the noise level by the Contractor.

C. Compliance

1. If the Lmax noise levels expressed in dBA, slow, obtained during the tests exceed those specified in Table 2, the Contractor shall promptly modify or alter such equipment, or substitute other equipment, and retest the equipment to show compliance with the noise level requirements.

2. Upon compliance, the Contractor shall submit the noise certificates to the Engineer for validation as specified in paragraph 1.03.I.

3. The Certificate of Noise Compliance will remain valid for a period of 6 months only. Delays caused by the certification rejection, and time lost in mitigating the rejected equipment or finding alternate acceptable equipment, shall not be a basis for any monetary or time delay claims, or for avoidance of late completion penalties.

3.06 COMPLAINT PROCEDURE

A. The objective of the complaint procedure is to ensure that public and agency complaints are addressed and resolved consistently and expeditiously.

B. If the Contractor receives a complaint regarding construction noise, the Contractor shall immediately notify the Engineer.

C. Upon receipt or notification of a noise complaint from the Engineer, the Contractor shall promptly perform noise measurements at the complainant's location during activities representative of the offending operation. The noise measurements shall be performed using equipment and methods as specified in Articles 2.02 and 3.01 and reported as specified in Article 3.02 of this Section. The complaint response noise measurements shall be immediately submitted to the Engineer as specified in paragraph 1.03.J of this Section.

D. In the event that the measured noise level exceeds allowable limits as specified in Article 1.04 of this Section, or is resulting in nuisance conditions, the Contractor shall immediately use noise reduction materials and methods such as, but not limited to, those described in Article 3.03 to reduce noise levels or to alleviate the nuisance conditions.

COMPENSATION

4.01 METHOD OF MEASUREMENT AND PAYMENT

A. The Noise Monitoring Plan and first Noise Control Plan will be considered incidental to Mobilization and will be considered part of the payment for Mobilization.

B. The 6-month Noise Control Plans, Equipment Noise Certifications, complaint responses, and monthly construction noise monitoring will be considered incidental to the Construction and will be considered part of the payment for related Construction.

C. Any noise control measures such as the required 16-foot high noise barrier shown in Figure 2, and any other acoustical enclosures and noise control curtains required by the Contractor to meet the project noise limits will be at the Contractor's expense and will be considered part of the payment for related construction.

TABLES AND FIGURES

TABLE 1. CONSTRUCTION NOISE LOT- LINE LIMITS[c]

Noise Monitoring Location Land Use	L10 Level (dBA)[b] (whichever is greater)	Lmax Level (dBA)[b]
DAYTIME (7 AM to 6 PM)		
Noise-Sensitive Locations	75 or Background + 5 (a)	85 (a); 90 (impact equipment)
Commercial Areas	80 or Background + 5 (a)	None
Industrial Areas	85 or Background + 5 (a)	None
EVENING (6 PM to 10 PM)		
Noise-Sensitive Location	Background +5	85
Commercial Areas	None	None
Industrial Areas	None	None
NIGHTTIME (10 PM to 7 AM)		
Noise-Sensitive Locations If Background < 70 dBA	Background +5	80
If Background > 70 dBA	Background +3	80
Commercial Areas	None	None
Industrial Areas	None	None

NOTES

(a) Noise from impact equipment is exempt from this requirement.

(b) All measurements shall be taken at the affected lot-line. In situations where the work site is within 50 feet of a lot-line, the measurement shall be taken from a point along the lot-line such that a 50-foot distance is maintained between the sound level meter and the construction activity being monitored.

(c) Lot-line noise limits shall apply to all points along the receptor's lot-line.

TABLE 2. EQUIPMENT 50-FOOT NOISE EMISSION LIMITS

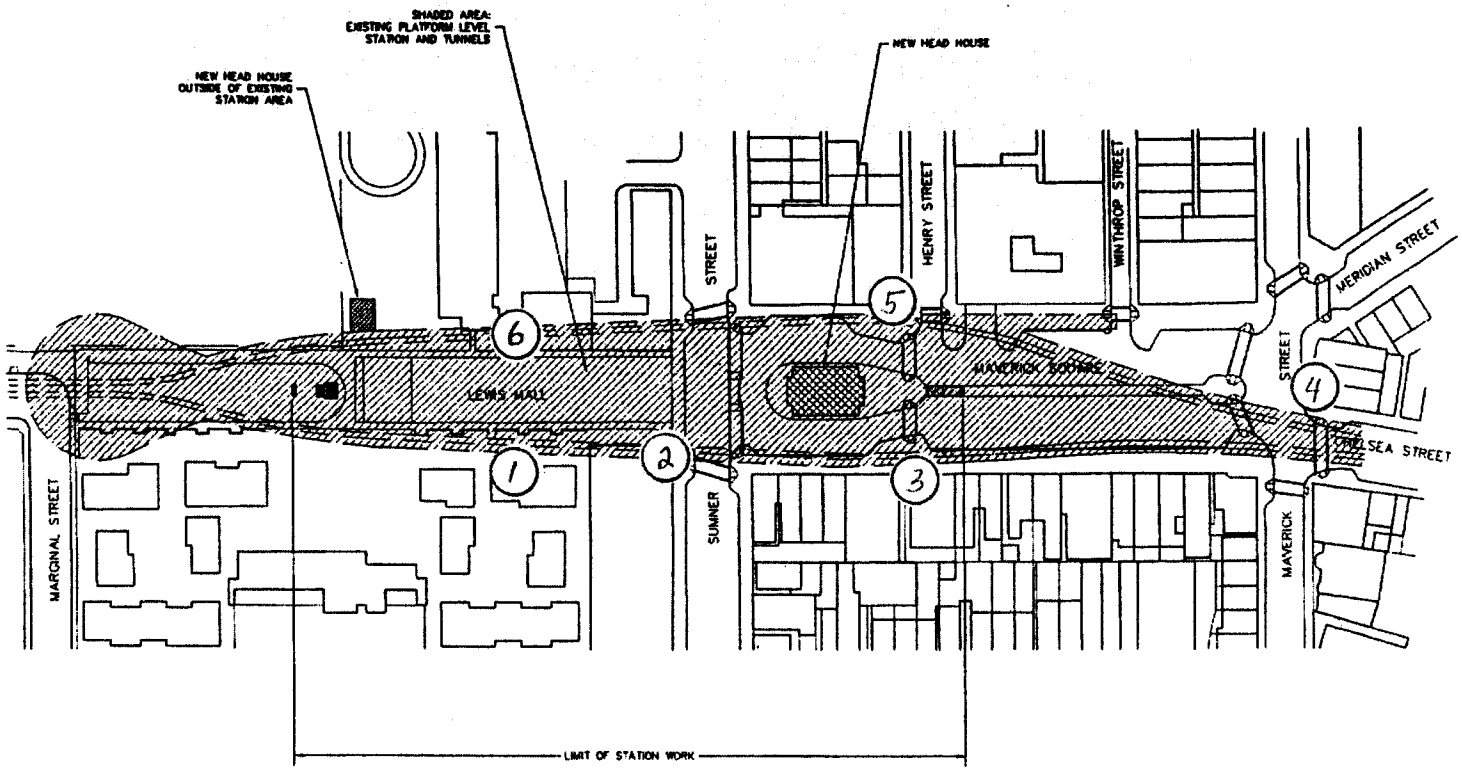
Equipment Category	Lmax Level (dBA)[1, 2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	95	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

NOTES:

a. Measured at 50 feet from the construction equipment, with a slow (1 sec.) time constant.
b. Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.
c. Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 3. ADJUSTMENTS FOR EQUIPMENT NOISE MEASUREMENTS AT LESS THAN 50 FEET

Measurement Distance (Feet)	Values to be Subtracted from Measured Noise Level to Estimate Noise Level at 50 Feet (dBA)
19-21	8
22-23	7
24-26	6
27-29	5
30-33	4
34-37	3
38-42	2
43-47	1
48-50	0



(#) **Noise Measurement Sites and Construction Noise Calculation Locations**

FIGURE 1: Location of Representative Noise Sensitive Receptors near the Maverick Station Construction Site

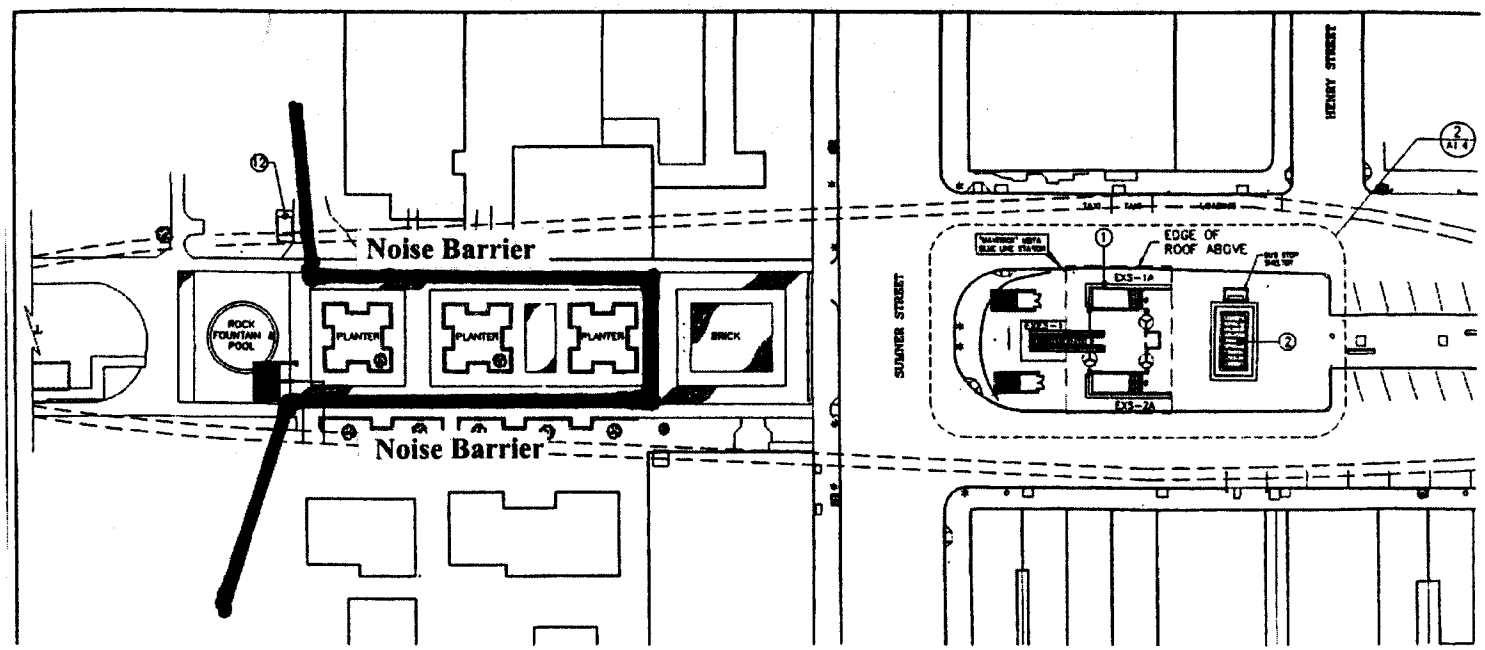


FIGURE 2: Location of the Proposed 16-foot High Noise Barrier

PART A: EQUIPMENT INVENTORY

Contract No.:_____ Contract Name:_____ Contractor:_____

Site:_____ Date:_____ Resubmit every 6 months

(ATTACH SITE SKETCH)

Code (a)	Equipment				Noise Limit (dBA) (f)	Estimated Noise at 50' (dBA) (g)	Date Begin (h)	Date End (I)	Daily Use (j)
	Category (b)	Model (c)	ID# (d)	HP (e)					
									D/E/N
									D/E/N
									D/E/N
									D/E/N
									D/E/N
									D/E/N
									D/E/N
									D/E/N
									D/E/N

FIGURE 3: NOISE CONTROL PLAN FORM - PART A

NOISE CONTROL PLAN (DUPLICATE AS NEEDED)

PART B: PREDICTED NOISE LEVELS

Contract No.:_____ Contract Name:_____

Contractor: _____ Site:_____

Date:_____ Land Use: _____

Time Period	Calculated Noise Levels (dBA)		Noise Level Limit (dBA)	
	Calculated L_{10} (dBA)	Calculated L_{max} (dBA)	L_{10} Limit (dBA)	L_{max} Limit (dBA)
Daytime				
Evening				
Nighttime				

NOISE ABATEMENT MEASURES

ANTICIPATED EFFECTS

CALCULATIONS - attach additional sheet(s) as needed

FIGURE 4: NOISE CONTROL PLAN FORM - PART B

CONTRACT NO(S):_____

DATE:_____

TIME:_____H_____
(0000 H - 2359 H)

NOISE MEASUREMENTS REPORT FORM

MEASURED BY:_____ OF: _____
(COMPANY)

MONITORING ADDRESS:_____
(PROVIDE SKETCH ON BACK)

LOCATION NO:__N -_____ WIND SPEED:_____ MPH DIRECTION:_____

LOCATION OF SOUND LEVEL METER: (NO CLOSER THAN 50 FEET FROM EQUIPMENT AND 5 FEET FROM REFLECTIVE SURFACE)

MONITORING WAS CONDUCTED:_____ FEET FROM EQUIPMENT (_____)
(TYPE(S); LEAVE BLANK FOR BASELINE)

LAND USE: ( ) RESIDENTIAL/INSTITUTIONAL ( ) BUSINESS/RECREATIONAL ( ) INDUSTRIAL

SOUND LEVEL METER: MAKE AND MODEL:_____

DURATION OF MEASUREMENT:_____

CALIBRATION LEVEL:_____

FIELD NOTES
(e.g., 2200-2205 H, AIRPLANE, 90dBA)

_____
_____
_____
_____
_____
_____
_____
_____

	Noise Level (dBA)	Noise Limit (dBA)
Lmax *		
L1		
L10 *		
L50		
L90		
Leq		

(*) indicates required noise measurement data

CHECK ONE OF THE FOLLOWING

( ) ONGOING CONSTRUCTION ( ) POST-CONSTRUCTION ( ) BASELINE CONDITIONS

(COMPLETE ALL THAT APPLY BELOW)

ACTIVE CONTRACT(S): _____
(LIST ALL CONTRACTS THAT CONTRIBUTE TO MEASURED NOISE)

COMPLAINT RESPONSE: _____
(DESCRIBE; INCLUDE LOG-IN NUMBER)

ABATEMENT FOLLOW UP: _____
(DESCRIBE)

FIGURE 5: NOISE MEASUREMENTS REPORT FORM

APPLICATION FOR CERTIFICATE OF EQUIPMENT NOISE COMPLIANCE

Contractor Name: _____

Contract Name & Number: _____

Equipment Type: _____

Manufacturer & Model NO.: _____

Identification Number: _____

Rated Power & Capacity: _____

Operating Cond. During Test: _____

Measured Lmax Noise Levels and Distance:

Right Side: _____ **dBA (SLOW), at** _____ **feet**
Left Side: _____ **dBA (SLOW), at** _____ **feet**

Adjusted Lmax Noise Levels at 50 Feet:

Right Side: _____ **dBA (SLOW).**
Left Side: _____ **dBA (SLOW).**

Equipment Noise Emission Limit (Table 2): _____ **dBA (SLOW)**

If equipment noise level exceeds maximum value allowed, indicate action taken to achieve compliance:

_____

_____

ACOUSTICAL ENGINEER
Name, Address & Phone No. _____

ACOUSTICAL ENGINEER
Authorized Signature: _____ **Date:** _____

CONTRACTOR'S CONCURRENCE:
Authorized Signature: _____ **Date:** _____

ENGINEER'S CONCURRENCE:
Authorized Signature: _____ **Date:** _____

FIGURE 6.: EQUIPMENT NOISE LEVEL DATA REPORTING FORM

SECTION 01562

DUST CONTROL SPECIFICATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies requirements for the control of dust generated by construction and renovation activities on the project site, on the roadways adjacent to the site, and in the station tunnel. Work activities requiring special attention to dust control include sand blasting, sawing, sanding, compacting of debris, loading and removal of debris from the site, and demolition activities.
B. Contractor is responsible for control of dust at all times for the extent of this Contract, 24 hours per day, 7 days per week, including non-working hours, weekends, and holidays.
C. Methods for controlling dust in construction/renovation area may include walls, barriers, screens, covers, water sprays and mists, and calcium chloride in accordance with this Section and all local, state, and federal regulations.
D. The Authority may limit dispersion of calcium chloride for dust control.

1.02 REGULATORY REQUIREMENTS

A. Dust control operations shall meet, as a minimum, the requirements of the Massachusetts Department of Environmental Protection, Code of Massachusetts Regulations (CMR) 310 CMR 7.00, "Air Pollution Control Regulations", specifically 310 CMR 7.09, "Dust, Odor, Construction and Demolition".
B. Work under this Contract shall be conducted in a manner that will not result in excessive particulate matter emissions, nuisance dust conditions, or concentrations exceeding the Massachusetts and National Ambient Air Quality Standard for PM10 (particulate matter with an aerodynamic diameter less than or equal to 10 microns) of 150 □g/m^3 on a 24-hour average basis or concentrations exceeding the Massachusetts and National Ambient Air Quality Standard for PM2.5 (particulate matter with an aerodynamic diameter less than or equal to 2.5 microns) of 65 □g/m^3 on a 24-hour average basis.

1.03 SUBMITTALS

A. Contractor shall submit a Dust Control Plan that outlines in detail the measures that will be implemented to comply with this Section, including suppression, windscreens and barriers, prevention, cleanup, and other measures. The Plan shall be submitted to the Engineer for review at least two weeks prior to the Contractor mobilizing at the site.
B. Contractor shall submit to the Engineer product literature and Material Safety Data Sheets for any dust suppression wetting agents and stabilizers that are proposed for use.

PART 2 – MATERIALS

2.01 DUST SUPPRESSION AGENTS

A. Dust suppression wetting agents shall be water soluble, non-toxic, non-reactive, non-volatile, and non-foaming.
B. Soil stabilizers shall be a sprayable organic or inorganic tackifier.

2.02 BARRIERS, SCREENS, AND COVERS

A. Windscreens shall be a durable fabric mesh of 50 percent porosity, attached to the demolition site fence.
B. Wind barriers shall be solid wood fences, solid durable fabric attached to temporary site fence, or other solid barriers intended to block the passage of wind.
C. Covers for stockpiles shall be plastic tarps. Contaminated soil covers shall be 20-mil. polyethylene sheeting or 10-mil. nylon reinforced polyethylene sheeting. The stockpile shall be placed on 40-mil. polyethylene sheeting.

PART 3 – DUST CONTROL

3.01 SITE DUST CONTROL

A. Control of dust shall be performed on an ongoing basis as long as the work is in progress. The work area must be kept free of dust and debris to within twenty feet of the construction/rehabilitation activities, subject to the satisfaction of the Engineer. Additionally, Contractor shall limit the length of the work area without collection of debris and dust to twenty lineal feet at any given time.
B. Control of dust, including staging areas, will be subject to the direction of the Engineer in order to minimize impacts to adjacent neighborhoods.
C. Water shall be applied at locations at such times and in the amounts as directed by the Engineer. Quantities of water wasted or applied without authorization will not be paid for.
D. The required suppression material shall be properly applied where directed by the Engineer and distributed uniformly at the rate specified or ordered. The means of distribution shall depend upon the kind of material used, and the method and equipment used shall be approved by the Engineer. The number and frequency of applications shall be determined by the Engineer.
E. Wet suppression shall be used to provide temporary control of dust from demolition/rehabilitation debris, excavated material, aggregate piles, and exposed soils and dirt. Several applications per day may be necessary to control dust depending upon meteorological conditions and work activity. To control dust, Contractor shall apply wet suppression on a routine basis as necessary or as directed by the Engineer.
    1. Wet suppression consists of the application of water or a wetting agent in solution with water. Wetting agents shall not be applied to plantable soils.
    2. Wet suppression equipment shall consist of sprinkler pipelines, tanks, tank trucks, or other devices, approved by the Engineer, which are capable of providing regulated flow, uniform spray, and positive shutoff. A suitable device for regulating the flow of water shall be located so as to permit positive operator control.
    3. Contractor shall provide the necessary means to retain on-site all water runoff generated by dust control and dispose of such water in accordance with the requirements of the appropriate regulatory agencies. Contractor shall be responsible for providing water, a means of disposal, necessary permits, and all appurtenances required to control dust.
F. Calcium chloride shall be used to control dust on-site instead of wet suppression when freezing conditions exist. Calcium chloride shall be uniformly applied by a mechanical spreader at 1½ pounds per square yard, unless otherwise directed by the Engineer. Contractor shall ensure that vegetation or soil to be used for vegetation is not treated.

G. The use of petroleum products for dust suppression is prohibited in this Contract.
H. Contractor shall provide windscreens and wind barriers in locations where they would be effective in minimizing wind erosion and the spreading of dust. Locations shall be submitted as part of Contractor's Dust Control Plan for review and approval by the Engineer. Contractor shall keep windscreens and barriers in good repair for the duration of the Contract.
I. During batch drop operations (e.g., material moved with a front-end loader clamshell bucket, or backhoe), the free drop height of the material shall be reduced as much as practical to minimize the generation of dust.
J. Contractor shall use wet suppression without a wetting agent during active stockpile load-in, load-out, and maintenance activities.
K. Contractor shall use soil stabilizers applied to the surface of inactive stockpiles.
L. Contractor shall use polyethylene tarps on stockpiles placed both below and on top of stockpiles, and secured with sandbags or an equivalent method to prevent the cover from being dislodged by the wind. Contractor shall repair or replace covers whenever they become damaged or dislodged.
M. The tarps shall be bermed to a height of 12" high at all edges to prevent any infiltration of storm water or runoff.

3.02 STATION DUST CONTROL

A. Contractor shall use wet suppression, temporary enclosures, and other suitable methods to limit dust and dirt scattering in the air to the lowest level practicable.
B. Temporary walls, shields, barriers, or partitions shall extend from the floor to the underside of the structure above. Such partitions shall be constructed as dust tight as practicable and shall be located along the edge of the platform inside the work area, as well as separating the work area from the passenger areas on the station platform.
C. Any access portal to the tunnel/station area shall be fitted with a dust proof cover, which is to remain in place whenever access is not required.
D. A wet spray power vacuum sweeper shall be used on paved areas. Dry power sweeping is prohibited.
E. Enclosed conveyors/chutes or container carts shall be used for the handling of debris where practicable. Dropping or throwing of debris is prohibited.
F. Contractor shall use polyethylene tarps on stockpiles placed both below and on top of stockpiles, and secured with sandbags or an equivalent method to prevent the cover from being dislodged by air movements. Contractor shall repair or replace covers whenever they become damaged or dislodged.
G. Debris shall not be stockpiled overnight. Debris shall be removed from the site daily.

3.03 PUBLIC ROADWAY DUST CONTROL

A. Contractor shall not permit any truck to leave the site with exterior mud or dirt on the vehicle body or wheels having the potential to be deposited on public roadways. Any foreign matter on the vehicle body or wheels shall be physically removed prior to the vehicle's entering of a public way.
B. Haul truck cargo areas shall be securely covered during material transport on public roadways.
C. Vehicle mud and dirt carryout, material spills, and material washout onto public roadways and walkways and other paved areas shall be cleaned up immediately.

D. Contractor is responsible for daily cleanup of public roadways and walkways affected by the work of this Contract. A wet spray power vacuum street sweeper shall be used on paved roadways. Dry power sweeping is prohibited.

PART 4 – PAYMENT

4.01 MEASUREMENT AND PAYMENTS

A. All materials and equipment necessary to provide dust control to satisfy regulatory requirements will not be separately measured and paid for, except as otherwise provided herein, but all costs in connection therewith will be considered incidental to the item or items of work to which dust control pertains.

SECTION 01563

RODENT CONTROL

PART 1- GENERAL

1.01 DESCRIPTION

A. This Section specifies rodent control within the limits of this Contract, in dump areas, land fills, or other areas designated by the Engineer.

1. Do not proceed with the rodent control work until written release is issued by the Authority.

1.02 QUALITY CONTROL

A. Exterminator Qualifications: Hold a current license issued by the Massachusetts Pesticide Board.

1. Employ service personnel for work on this Contract, each having experience in rodent control procedures.

B. Rodent Control

1. Comply with City of Boston Inspectional Services Department for Rodent Control. Due to the nature of construction, location of the Project, and chronic rodent history, an I.P.M. certified pest control company shall be engaged.

2. Pest control efforts shall be done at least 30 days prior to construction commencement. Work shall include the work zone, and surrounding area (100-300 ft.), surface and subsurface, for the duration of the project.

1.03 SUBMITTALS

A. Schedule indicating material, quantity, methods, and time schedule for extermination for approval.

B. A written I.P.M. plan by the Pest Control Contractor shall be submitted, reviewed and approved by the City of Boston Inspectional Services Environmental Unit prior to commencing construction.

C. Ten days prior to commencement of rodent control procedures, furnish to the Engineer the name of rodent control licensed exterminator, date of initial rodenticide application, and methods and materials to be employed.

D. Manufacturer's printed application instructions for the approved toxicants.

E. Bi-weekly individual reports on activities, including location of sites treated, amount and types of rodenticides used during the month, and determinable results of the program.

1.04 LIABILITY

A. Contractor shall be liable for death or injury to persons or domestic animals in the use of the toxicants and shall determine the appropriate material from the materials list for each treatment.

1.05 MATERIALS

A. Limit toxicants in rodent baits to the following:

1. Antu.
2. Cyanaogas.
3. Anticoagulant.
4. Zinc Phosphide

1.06 APPLICATION

A. Apply materials in strict accordance with EPA approved label directions, and the Rules and Regulations of the Massachusetts Pesticide Board.

B. First Application: Blitz; apply immediately after execution of the Contract and written release by the Authority. Use zinc phosphide or other specified toxicant with suitable bait, placed so as to attract the greatest possible number of rodents.

C. Anticoagulant, such as Warfarin, shall be applied in accordance with manufacturer's standard recommended practice and as follows:

1. Place anticoagulant in sealed, moisture resistant containers such as glassine, paraffin blocks, or comparable protective material, and distribute as recommended.

2. Place a moisture—resistant plate or pan in bait station or other suitable cover. Protect from moisture, rain, snow, or dust. Do not place in direct contact with earth, concrete or masonry.

3. Inspect anticoagulant bait a minimum of once each week and replenish with fresh material when necessary.

D. Maintain accurate records of placement, type, and volume of rodent baits applied.

E. If migration of rodents occurs onto adjacent private properties or into adjacent MBTA structures and, in the opinion of the Engineer, is attributable to the Contractor's operations, the Contractor shall be required to enter upon the property with the permission of the property owner and provide for the control and removal of the rodents.

F. Applications shall not be performed within wetlands or the 100-foot wetlands buffer zone.

1.07 MAINTENANCE

A. Within one week after initial application, institute a program of maintenance to rid structures and adjacent areas, within limits of this Contract, of rodents, and prevent their migration to abutting properties. Maintenance shall continue for the duration of the Contract.

1. Apply anticoagulants in the required percent mixture with suitable cereal in structures and torpedo form in open areas.

2. Renew toxic bait semi-monthly throughout maintenance period and as required by the Massachusetts Pesticide Bureau Requirements.

1.08 CLEANUP

A. Remove carcasses daily and dispose of properly according to law.

B. Upon completion of operations at site, remove remaining exposed bait or anricoagulant packages and dispose of properly according to law.

1.09 MEASUREMENT AND PAYMENT

A. Measurement: Work specified in this Section for Rodent Control will not be measured but will be paid for under an allowance for Item 0213.201. The allowance will be adjusted to the actual amount paid for all such work. The Contractor shall furnish itemized statements of the work performed and give the Engineer access to accounts, bills, and vouchers relating thereto, and unless the Contractor does furnish such itemized statements, bills, and vouchers, he shall not be entitled to payment for the related work. The allowance will be made to reimburse the Contractor for all services required for the work specified herein.

B. Payment: Payment for the work of this Section will be based on itemized statements furnished by the Contractor to the Authority without any mark-up for overhead or profit. No other costs will be paid for work of this Section.

C. Payment Item:

Item No.	Description	Unit
0213.201	Rodent Control	Allowance

END OF SECTION

SECTION 01568

CONSTRUCTION SAFETY

1.01 DESCRIPTION

A. This Section specifies requirements to establish a practical, sound, and effective program for the prevention of accidents, and to assign specific responsibilities to Contractors for program compliance.

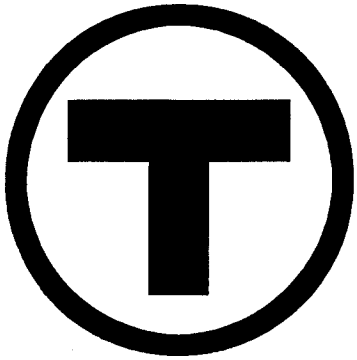
B. This basic safety program has been designed to assist all site Contractors and their supervisors to recognize, evaluate and control hazardous activities and conditions within their respective areas of contract responsibility.

C. The attached MBTA "Construction Safety Manual," including Safety policy/Procedure (Contractor Safety Violation Program) forms a part of the Contract Specifications and is hereby included on the following pages of this Section 01568.

1.02 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item of work to which they pertain.

CONSTRUCTION SAFETY MANUAL



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
BOSTON, MASSACHUSETTS

Prepared by:

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
SAFETY DEPARTMENT

Date Issued: October 26, 1995

Revision: 1.0

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DEFINITIONS

TERM	ABBREVIATION	DEFINITION
MBTA Project	PM	Authorized representative of the Manager MBTA responsible for specific contracts administered by the Resident Engineers.
MBTA	CM	The Authority is responsible for construction management
Contract		The written agreement executed by the Authority and the Contractor, setting forth the obligations of the Parties thereunder.
Contractor		The individual, firm, partnership, corporation, or combination thereof, private, municipal or public, including joint ventures, which, as an independent contractor, has entered into a Contract with the Authority, as Party or Parties of the Second Part, and who is referred to throughout the Contract Documents by singular number.
Subcontractor		The individual, firm, partnership, corporation, vendor, supplier, or combination therefor to whom the Contract, with written approval of the Authority, sublets any part of the Contract.
General Engineering Consultant	GEC	Specific for each contract.
Project		That specific portion of MBTA Transit System indicated in the Contract Documents.
Engineer		The General Manager of the Authority or designee Acting within the scope of the particular duties entrusted to this person.
Resident Engineer	RE	MBTA's field representative responsible for the completion of specific construction contracts.
Contractor Project	CPM/CPS	Contractor's senior management official Manager/Superintendent responsible for the Project beginning with preconstruction activities and extending to final completion of the work.
Safety Director	SD	MBTA's Director of Safety
Contractor Safety Supervisor	CSS	Representative of the Contractor whose sole responsibility is safety and loss prevention.

TERM	ABBREVIATION	DEFINITION
Experience		Individual who possesses at least five years of heavy construction experience, three of which include full-tie on-site safety responsibility. Must be knowledgeable through education and training in occupational safety and health laws and regulations (construction and general industry). It is preferred that the individual possess the CSP designation.
MBTA Safety Manager	PSM	MBTA appointed representative responsible for safety implementation.
Foreman	F	Contractor's Craft Supervisor.

1.0 ADMINISTRATION AND ORGANIZATION

1.1 PURPOSE AND SCOPE

To establish a practical, sound and effective program for the prevention of accidents, and to assign specific responsibilities to Contractors for program compliance.

This basic safety program has been designed to assist all site Contractors and their supervisors to recognize, evaluate and control hazardous activities and conditions within their respective areas of contract responsibility.

The minimum accident prevention activity expected from each Contractor is indicated in each of the following program sections; fewer than these minimums
will be considered substandard.

1.2 PROGRAM OBJECTIVES

The objective of this policy is to establish the concept that people and property are our most important assets.

To achieve this goal, all Project safety and loss control efforts shall be directed towards a single goal, the elimination of personal injuries and damage to property, and to minimize the effects of accidents on both the individuals and on the project. Beyond satisfying the obvious humanitarian and moral obligations, specific objectives of the program are:

a. Increased efficiency and attendant cost reductions.

b. Compliance with all statutory requirements.

c. Maintenance of favorable labor and community relations.

d. Improvements of relationship with regulatory agencies.

e. Avoidance of penalties.

1.3 PROGRAM EFFECTIVENESS

The effectiveness of the MBTA Construction Safety Program will depend upon the active participation and personal cooperation of all supervisors and employees, and positive coordination of their efforts toward carrying out the following responsibilities:

1.3.1 Establishing and maintenance of a positive environment and attitude by all levels of management.

1.3.2 Proper planning of all work to minimize personal injury, property damages and loss of production efforts.

1.3.3 Provide constant and consistent safety.

1.3.4 Establish and maintain a system for early detection and correction of unsafe practices and conditions.

1.3.5 Provide adequate protection of adjacent public and private properties to provide for the safety of the public.

1.3.6 Establish and implement safety education programs designed to stimulate and maintain the interest and active participation of all personnel involved with the Project.

a. Safety meetings and safety communications.

b. Investigations of accidents and safety incidents to determine cause, and the taking of necessary corrective actions.

c. Use of proper work procedures, personnel protection equipment and mechanical guards.

d. Safety instruction to individual employees and group safety training program.

c. Maintenance of records of accidents and losses and development of accident/loss experience summaries.

1.4 ORGANIZATION AND ADMINISTRATION

1.4.1 Project Safety Organization

See Exhibit 1-1, Project Safety Organization Chart.

1.4.2 General

This document establishes minimum standards of performance for the implementation and conduct of Safety Operations during the course of a Project.

Each contractor shall take all reasonable precautions in the performance of the work under his contract to protect the safety and health of its employees and members of the public and shall comply with all applicable MBTA, Local, State and Federal safety and health regulations and requirements (including reporting requirements).

The MBTA shall notify the Contractor of any non-compliance and of the corrective action required. This notice, when delivered the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the non-compliance and corrective action required after receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to take corrective action promptly, the MBTA may, without prejudice to other legal or contractual rights, issue an order stopping all or part of the work; and may subject contractor to safety violation assessments as deemed appropriate by the MBTA thereafter, resumption may be issued at the discretion of the MBTA.

The Contractor shall maintain an accurate record of exposure data on all accidents and incidents occurring under this contract and report this data in a manner prescribed by the MBTA.

The Contractor shall be responsible for all its lower-tier subcontractor's and vendor's compliance.

Contractor management shall make a commitment for accident prevention and fire prevention. Safety shall take precedence over schedule and production. Enforcement action is mandatory.

1.4.3 Safety Responsibilities

a. Contractor

To assist Contractors in fulfilling their responsibility, a Construction Safety Inspection Check List (Exhibit 5.1) has been included in this manual for their use. Contractors are reminded that this list is not all inclusive and must be considered only a minimum. Contractors should add to it for their particular type of work and work site conditions.

The key to an effective safety program is a proactive Contractor who is expected to take the initiative in accident prevention. Contractors, managers and supervisors will be held accountable for the Safety performance demonstrated by the employees under his/her supervision. The Contractor's responsibilities for safety cannot be delegated to Subcontractors, suppliers of other individuals. Each Contractor is required to designate a full-time; on-site Safety Supervisor who is charged with sole responsibility of on-site safety management under the direction of the Contractor's Project Manager/Superintendent. It is expected that potential safety hazards found to exist on the job will be promptly corrected through informal communications between the Contractor between the Contractor and the MBTA. notwithstanding these informal procedures, it should be clearly understood that formal communications regarding accident prevention and safety enforcement shall be maintained between the Contractor and the MBTA. Such formal communications are necessary to provide follow-up action on the part of the Contractor and to prevent misunderstandings.

The Contractor is responsible for compliance with the accident prevention and safety requirements contained in this manual and its contract with the MBTA. To achieve this goal, the Contractor shall:

1. Within five (5) days after receipt of notification of contract award, submit to the MBTA a letter signed by the senior operating official of the Contractors organization setting forth the following:

    a. A statement of its company's safety policy based upon compliance with the MBTA Construction Safety Program.

    b. A detailed site specific safety plan which reflects the Contractor's intentions for full and complete compliance with the MBTA Construction Safety Program and the provisions of its contract with the MBTA.

    c. A statement which will reflect its awareness and knowledge of all local, state and federal health and safety codes applicable to its contract with the MBTA.

2. Submit a resume of the qualifications and work experience of the designated Safety Supervisor proposed for assignment to the Project as specified by the Safety and First Aid requirements Section of the Contract. The resume shall be reviewed by the MBTA Safety Department. Contractor's designated Safety

Supervisor may be required to appear for a personal interview before designated representatives of the MBTA Project staff and the MBTA Safety Department.

3. Establish and maintain an orientation program for new employees which shall include:

   a. For each individual the hazards present in their work assignment and in the general area in which he will be working.

   b. Personal protective equipment required.

   c. Instruction in the proper procedure for reporting unsafe job conditions which he/she may encounter.

   d. All workers employed by the Contractor who are to work within the Authority's track area, right-of-way or adjacent to the power traction system, shall be required to attend an up to four (4) hour safety awareness course at the Authority's Safety Training location. The location and time of such school will be at the sole discretion of the Authority. The intent of this course is to make the Contractor's personnel aware of the particular hazards related to the Authority's operations.

      At the completion of the Safety Awareness Training, attendees will be issued a serialized sticker for the hard hat and a serialized certification card. The employee must display the hard hat sticker on the left side of their hard hat and carry the card certification on their person at all times when working on the Authority projects. (See Exhibit 1-2)

   e. All personnel working in the immediate vicinity of, or within the right-of-way are required to wear orange safety vests similar to standard Authority equipment. In addition, all Contractors personnel or groups of personnel, working within the right-of-way or within eight (8) feet of track will require the presence of an Authority flagperson on duty at all times.

4. Furnish to the MBTA a copy of all citations and/or warnings of safety violations received from any state or federal jurisdiction agency by its organization or by any of its subtier Contractor organizations.

b. <u>Contractor's Project Manager/Superintendent</u>

As the direct representative of the Contractor at the site the Project Manager/ Superintendent shall:

1. See that the Contractor's responsibilities set forth in the safety provisions are fully complied with.

2. Supervise the designated Safety Supervisor in the discharge of its duties and responsibilities.

3. Plan and execute all work in compliance with the stated objectives of the MBTA Construction Safety Program.

4. Assure cooperation with the MBTA Safety Project Manager.

5. Take immediate action to correct unsafe or unhealthful work practices or conditions as necessary.

6. Review and implement administrative actions required to maintain complete and accurate safety records as specified by the MBTA Construction Safety Program recordkeeping requirements.

7. Attend safety meetings as directed by the MBTA Safety Project Manager.

8. Assure that appropriate first aid plans and facilities are established and implemented as stated and outlined in contract.

c. **Contractor's Safety Supervisor**

1. Make daily safety inspections of the job site(s) and public area contiguous and adjacent thereto and take necessary and timely corrective action(s) to eliminate unsafe acts and/or conditions. Record observations as directed using Construction Safety Survey Report Form Exhibit 8-1 in conjunction with Job Site Daily Safety Checklist.

2. Construction Safety Audit Checklist (Exhibit 5-1) will be completed weekly by Contractor's Safety Supervisor.

3. Review Foreman accident and investigation reports, as required, to assure timely submission, and to initiate corrective action(s) to prevent recurrence.

4. Provide Foremen with material suitable for use in conducting weekly "tool box" safety meetings.

5. Review safety meeting reports submitted by Foremen to ensure adequacy of training as well as subject matter.

6. Assist Foreman in accident investigations and preparation of required reports.

7. Establish and implement a safety training program for Supervisors and employees as applicable to their specific job.

8. Encourage establishment of incentive programs designed to recognize individual employee safety efforts and contributions towards improved safety.

9. Attend safety meetings held by the MBTA.

10. Maintain copies of all required Contractor safety reports.

d. **Foremen**

Foremen are in first level of supervision. These are the key individuals in an effective safety program. Their initiative and efforts toward accident prevention on their daily assignments largely determines whether or not a required high degree of safety exists on the job.

A Foreman's responsibility includes:

1. Inspection of its assigned job area to assure that unsafe acts or conditions are identified and corrected.

2. Ensures that safety requirements are adhered to and enforced.

3. Provides and requires the use of proper personal protective equipment and suitable tools for the job.

4. Sets a good example for his/her crew in the matter of safety.

5. Sees that his/her assigned crew is properly instructed in safe work practices when they first arrive on the job and every day thereafter.

6. Investigates all accidents under his/her direct control to determine facts necessary for corrective action.

7. Promptly completes accident reports as required.

8. Conducts weekly "toolbox" safety meetings with personnel to:

   a. Discuss type of work to be or being accomplished and potential risks and/or unsafe conditions to be aware of.

   b. Discusses unsafe work practices and conditions noted.

   c. Reviews accident experience with the crew and discuss corrective action(s).

   d. Encourages personnel to make safety suggestions and to pass these onto the Safety Supervisor for evaluation and possible implementation.

   e. Ensures that prompt first aid is administered.

e. **MBTA**

The MBTA is responsible for:

1. Inspection, surveillance, and monitoring the safety practices of the Contractor.

2. Requiring timely application of safety and accident prevention procedures to all job site activities and to all persons on the Project including Subcontractor, Visitors, Suppliers and other authorized personnel.

3. Documenting unsafe work conditions wherever observed and reports these conditions per internal MBTA guidelines and issuing citations when warranted, for willful safety violations.

4. Notifying Contractors, in writing, of persistent noncompliance with Project safety requirements.

5. Notifying Contractors or individuals who continually and deliberately violate safety regulations and where appropriate, initiate action to the Contractor or individual from the Project.

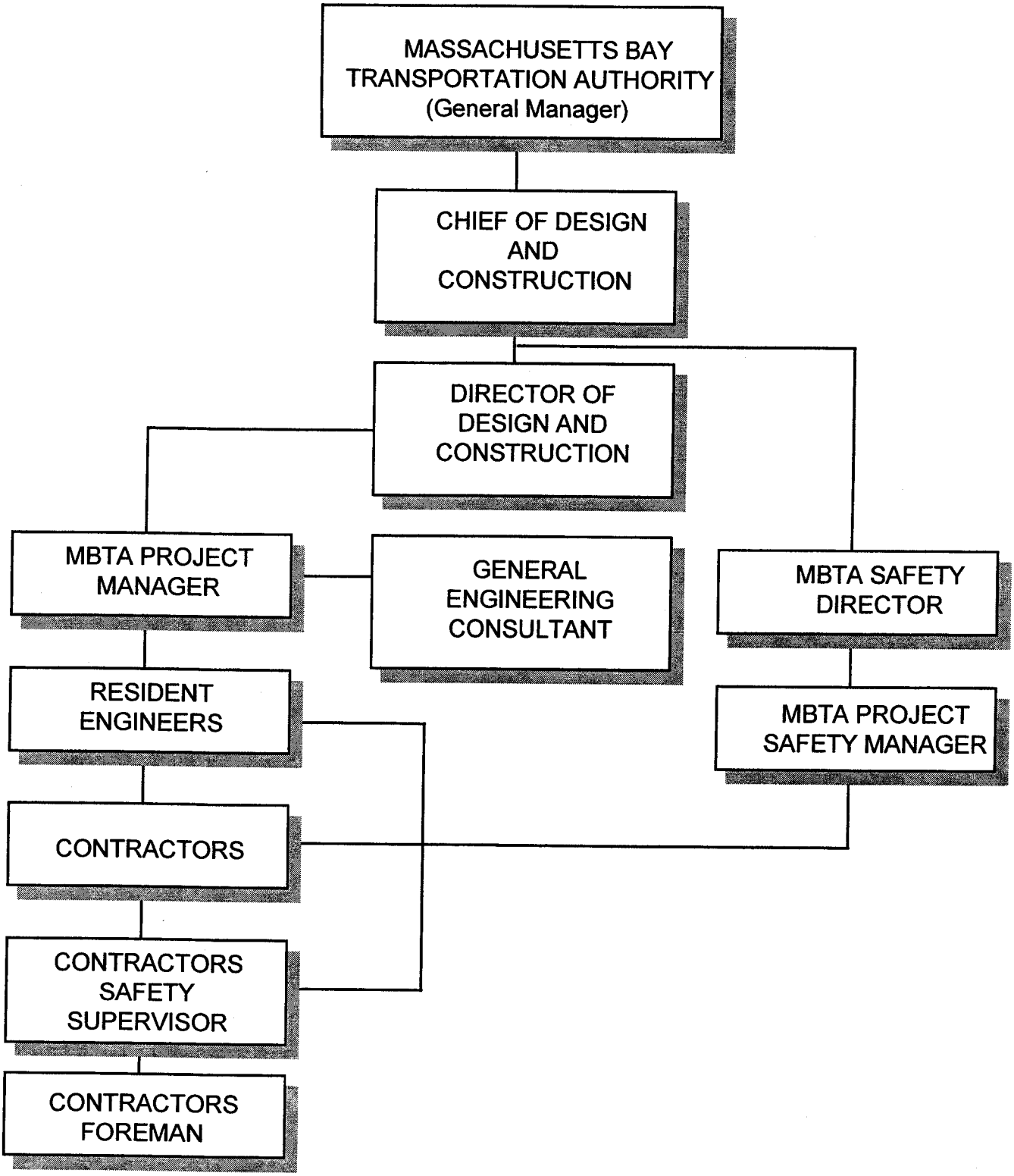
6. In the event of imminent danger requiring immediate corrective action(s). The MBTA, through its designated representative(s), is authorized to order a work stoppage until such time as the condition is corrected.

7. Arranging for or conducting safety training for both contractor and MBTA personnel.

f. Resident Engineer

The MBTA Resident Engineer provides on-site leadership to assigned inspection staff to determine that the construction work is accomplished safely and in accordance with contract plans and specifications.

CONSTRUCTION PROJECT SAFETY ORGANIZATION CHART



2.0 GENERAL SAFETY REQUIREMENTS

2.1 SUBMITTAL OF SAFETY PROGRAM AND QUALIFICATIONS

The contractor shall, within five (5) days after receipt of the award of a contract, submit for approval to the MBTA, a detailed operational Safety and Health Plan. Along with the Plan, the contractor shall submit the name and qualifications of the designated management official assigned responsibility for implementation and administration of the program. The contractor's safety supervisor shall attend MBTA Safety meetings as required. Also, the contractor shall submit its past three (3) years industrial injury/illness experience for review. Submittal of this experience may be in or obtained from OSHA Form 200. Note: Each employer is subject to record keeping requirements of OSHA 1970, thus must maintain logs and experience modification of all recordable occupational injuries and illnesses.

2.2 REQUIREMENTS

2.2.1 Emergency Action Plan

The Contractor shall establish in its safety plan procedures to handle emergencies created by the following:

a. Injuries to employees.

b. Injuries to the general public on or adjacent to the work site.

c. Property damages with particular emphasis on utilities, pedestrian and vehicular routes.

d. Fire

e. Natural disasters such as earthquakes.

f. Public demonstrations such as mobs, riots, etc.

g. Bombs or other destructive threats.

h. Hazardous material, exposures or other potential hazards that may occur at work site.

i. Severe weather, particularly lightening storms and high winds. Emergency action plans shall be compatible with local police and fire procedures. Emergency procedures shall ensure that Contractor's most senior supervisor present take charge and directs the handling of the emergency.

Emergency procedures shall be reviewed frequently to ensure that Contractor personnel are familiar with the proper actions to take, and that emergency telephone numbers are current. All emergency procedures shall be reviewed and approved by, and coordinated with the MBTA Safety Department Emergency procedures and actions required shall be discussed regularly with the Contractor's supervisory personnel and at "tool box" safety meetings.

2.2.2 First Aid Facilities

In formulating the Emergency Action Plan, the Contractor shall provide for the establishment and staffing of appropriate first aid facilities for the treatment of on the job injuries.

Off-site medical treatment of employee injuries shall be performed at medical facilities named in the Contractor's Safety Submittal.

2.2.3 Serious Accidents

Serious accidents shall be reported immediately to the MBTA Resident Engineer. Contractor's shall issue standing orders to all supervisors directly in charge of operations that the scene of the accident shall not be disturbed, except for rescue or other emergency measures, until otherwise directed. Contractor's forces either witnessing or party to the accident shall be detained at the site to provide detailed accounting of facts.

2.2.4 Posting of Emergency Telephone Numbers

To ensure that emergency actions are promptly taken, Contractors shall post emergency telephone numbers in a conspicuous place(s) (all telephone locations). See Exhibit 2-2.

2.2.5 Emergency Plan Implementation

Should an emergency occur, the Contractor shall:

a. Immediately secure the area and implement the emergency action plan.

b. Notify the MBTA Resident Engineer.

c. Provide information regarding the emergency to authorized MBTA representatives only. Questions from the press and media should be referred to the Public Relations/Communications Department of the MBTA.

2.3 Protection of the Public

2.3.1 Protective Measures

All necessary precautions to prevent injury to the public or damage to property of others shall be taken. The public is defined as all persons not employed by or under contract or subcontract to the MBTA. Installation of temporary barriers and/or fencing designated to protect the public shall be reviewed and approved by the MBTA. Precautions shall include but not be limited to the following:

a. Work shall not be performed in any area occupied by the public unless specifically permitted by the contract or in writing by the MBTA

b. When necessary to maintain public use of work areas involving sidewalks, entrances to buildings, lobbies, corridors, aisles, stairways, vehicular roadways, etc., the Contractor shall protect the public in accordance with the applicable OSHA Construction Safety Standards 1926.

c. Sidewalks, entrances to buildings, lobbies, aisles, doors or exits shall be kept clear of obstructions to permit safe ingress and egress of the public at all times.

d. Appropriate warnings, signs and instructional safety signs shall be conspicuously posted where necessary. In addition, a policeman/flagperson shall control the moving of motorized equipment in areas where the public might be endangered.

e. Sidewalks, sheds, canopies, catch platforms and appropriate fences shall be provided when necessary to maintain public pedestrian traffic adjacent to the erection, demolition or structural alteration of outside walls on any structure. The protection required shall be in accordance with all applicable laws and regulations.

f. Whenever practicable, a temporary fence shall be provided around the perimeter of above ground operations adjacent to public areas except where a sidewalk shed or fence is provided by the Contractor as required by subparagraph e., above. Perimeter fences shall be at least six (6) feet high. They may be constructed of wood or metal or wood frame and sheathing, wire mesh, a combination of both, or as otherwise provided in contract documents. When the fence is adjacent to a sidewalk near a street intersection, at least the upper section of fence shall be open wire mesh from a point not over four (4) feet above the sidewalk and extending at least twenty-five (25) feet in both directions from the corner of the fence.

g. Guard rails shall be provided on both sides of vehicular and pedestrian bridges, ramps, runways and platforms. Pedestrian walkways elevated above adjoining surfaces, or walkways within six (6) feet of the top of excavated slopes or vertical banks, shall be protected with guardrails, except where sidewalk sheds or fences are provided as required by subparagraph e., above. Guardrails shall be constructed in accordance with MBTA requirements.

h. Barricades shall be provided where sidewalk shed, fences or guardrails as referenced above are not required between work areas and pedestrian walkways, roadways or occupied buildings. When a barricade is removed temporarily for the purpose of work, a policeman/flagperson shall be placed at all openings.

i. Temporary sidewalks shall be provided when a permanent sidewalk is obstructed by the Contractor's operations. Guardrails shall be provided on both sides of temporary sidewalks.

j. Warning signs and lights shall be maintained from dusk to sunrise along guardrails, barricades, temporary sidewalks and at every obstruction to the public. They shall be placed at both ends of such protection or obstructions and not over twenty (20) feet apart alongside of such protection or obstruction.

k. Fuel-burning type lanterns, torches, flares or other open flame devices are prohibited within twenty (20) feet of open utility manholes until certified safe for entry.

2.4 Group Tours and Site Visitors

2.4.1 Conduct of Tours

It is particularly important that a high degree of protection be afforded all persons on authorized tours of construction worksites. The following instruction shall be complied with, as applicable, by the Contractor and those responsible for arranging such tours. Except for technical

inspection tours, made by MBTA staff members and their sponsored guests, the following procedures shall be followed:

a. Group tours must be cleared through the MBTA, allowing maximum advance notice and in compliance with MBTA Policy and Procedures.

b. MBTA will coordinate the tour arrangements and ensure notification to the Contractors Project Manager.

c. MBTA will coordinate the following with the individual or organization requesting the tour:

1. Number of Visitors - Tour groups in non-hazardous areas will be limited to no more than 10 person per tour guide.

2. Clothing - Visitors will be required to wear pants or slacks, shirt/blouse, and suitable work shoes.

3. Children - Children under 12 not permitted on tours. Children ages 12 to 15 must be accompanied by an adult.

4. Protective Equipment - Hard hats, raincoats, eye protection, earplugs, and other protective devices will be required as necessary.

5. Release and Hold Harmless Agreement - Each visitor shall be required to sign the agreement prior to the commencement of the tour. MBTA staff members and guides shall familiarize their group(s) with the hazards to be encountered on the tour prior to entering the worksite.

2.5 Substance Abuse/Prevention/Testing Program

2.5.1 The Contractor shall establish a substance abuse policy and testing program that includes the following elements:

- $ Deterrence
- $ Treatment and Rehabilitation
- Detection
- $ Enforcement

The MBTA reserves the right to approve the proposed substance abuse program prior to commencing the contract.

2.6 Criteria for Substance Abuse Policy and Testing Programs for Construction Contractors

Each contractor will have in place a written policy on substance abuse that emphasizes the goal of maintaining a drug and alcohol free workplace. This policy should contain minimally the following elements:

2.6.1 Deterrence

Use of drugs and alcohol while on or near MBTA property is strictly forbidden. Each employee should receive a copy of the policy on substance abuse and appraised of the requirement that he/she is expected to be drug/alcohol free when reporting for work and at all times while on or near MBTA property or while acting in any capacity as an agent of the contractor.

2.6.2 Treatment and Rehabilitation

Information regarding treatment and rehabilitation programs must be made available to employees. This can be accomplished by providing information regarding such program that are available through health insurance benefits, union health and welfare funds, Employee Assistance Programs, or community organizations. Employees are responsible for any costs related to rehabilitation or treatment that are not covered by health insurance or union health or welfare funds. Employees should be encouraged to seek help for drug and/or alcohol problems before their job performance is affected.

2.6.3 Detection

Each contractor, in order to promote and maintain a drug and alcohol free environment, will utilize a program of drug and/or alcohol screening which will be mandatory under the following conditions:

a. Pre-Employment

Prior to assignment, all contracted employees will be required to submit a drug and/or alcohol test as a condition of employment. Prior to the test, the employee must sign a release authorizing the procedure.

A urine test will screen for the presence of marijuana, cocaine, opiates, phencyclidine (PCP), amphetamines, barbiturates, benzodiazepenes, methadone, methaqualone, and propoxyphene. A blood test will screen for alcohol.

b. Probable Cause

An employee who reports to work in an unfit condition or is found to be unfit while on duty and/or who exhibits behavior which provides one (1) supervisor with probable cause that the employee is unfit for duty will be required to submit to a drug and alcohol screen. The employee will be given a urine test for marijuana, cocaine, opiates, phencyclidine (PCP), amphetamines, barbiturates, benzodiazepenes, methadone, ethoaqualone, and propoxyphene. A blood test will screen for alcohol.

c. Post Accident/Incident

Whenever any of the following occurs, the employee(s) involved will be required to submit to a drug and alcohol screen.

$ Any MBTA-related event on/or involving MBTA property or personnel that results in a fatality.

$ Any MBTA-related personal injury to an employee, or member of the public, which requires or should reasonably require medical attention.

$ Any MBTA-related event causing significant or unusual property damage, as determined by an MBTA management official.

$ Any MBTA event which appears to involve violation of Authority rules which poses a safety threat to employees or members of the public. The employee(s) in these situations must be tested unless at the time of the accident/incident the employee's performance can be completely discounted as a contributing factor to the accident/incident. The screen should be completed immediately, but absent unusual circumstances, not more than eight (8)hours after the accident/incident in question.

In the event of hospitalization and unless medical precluded, a drug/alcohol will be ordered at the treatment facility if treatment is expected to exceed eight (8) hours.

This drug and alcohol screen will be identical to that utilized in Probable Cause.

d. Return to Work

Whenever an employee returns to work under the conditions listed below, the employee will be required to submit to a drug/alcohol screen before returning to work.

This drug and/or alcohol screen shall be required when:

The employee has previously failed a post accident/incident, probable cause, return to work or random screen.

The employee is returning from a drug and/or alcohol rehabilitation program known to or arranged by the contractor or made known to the contractor.

The employee is returning to work for any reason from an absence longer than thirty (30) calendar days. This drug and alcohol screen will be identical to that utilized in Probable Cause.

e. Random

All employees will be submitted to drug screening on an unannounced and random basis. A scientifically valid method of selection must be utilized to ensure that each employee has an equal chance of being selected.

A urine test will be used to screen for the presence of marijuana, cocaine, opiates, phencyclidine (PCP),and amphetamines.

2.6.4 Enforcement

Enforcement of the policy and testing program is essential if deterrence, treatment, and detection are to be successful. Accordingly, the use, sole or possession of illegal drugs, and use of intoxicants resulting in unfitness for duty as well as the use or possession of intoxicants on any construction site is prohibited and will result in the employee's permanent removal from the project.

a. Consequences of Positive Test Result

1. Pre-Employment

A positive drug or alcohol test result in this category will render the individual not qualified for employment on an MBTA project. The individual can reapply for employment after one (1) calendar year. However, the applicant must provide documentation that he/she has received rehabilitation/treatment for substance abuse in order to be considered for employment after the one year period.

2. Post Accident/Incident

Any employee involved in an accident/incident who tests positive for drugs and/or alcohol will be discharged, regardless of the ultimate preventability determination or the extent of any damage or personal injury.

3. Probable Cause

Any employee who tests positive for drugs and/or alcohol pursuant to a probable cause screen will be discharged. The probable cause determination will be made by one Authority supervisor/manager.

4. Return to Work

Any employee who tests positive for drugs and/or alcohol pursuant to a return to work screen shall be suspended for forty (40) working days. During this period, he/she will be required to obtain an evaluation by a substance abuse professional (SAP). The substance abuse professional shall be an individual who is a licensed physician (medical doctor or doctor of osteopathy), or a licensed or certified psychologist, social worker, employee assistance professional or additional counselor (certified by the National Association of Alcoholism and Drug Abuse Counselors Certification Commission), with knowledge of an clinical experience in the diagnosis and treatment of drug and alcohol related disorders. The employee will be required to submit to any and all treatment recommendations made by the SAP. The cost of any recommendations made by the SAP. The cost of any recommended treatment or counseling as well as the initial evaluation by the SAP will be at the employee's own expense unless covered by health insurance or union health and welfare funds.

The employee will not return to work without documentation from the SAP that he/she has completed all treatment recommendations. In addition, the employee will be required to submit to and pass a return to work drug and alcohol screen. A second positive screen in this category will result in discharge.

5. Random

Any employee who fails a random drug screen will be subject to the disciplinary actions as outlined above under return to work.

6. Refusal to Take Test

Any employee who refuses to submit to any drug and/or alcohol test, either by word or action, will be discharged. This will include any employee who fails to provide a urine sample within a reasonable time period. However, employees who have difficulty providing a sample will be given liquids and an ample opportunity to produce a sample. This time period should not exceed two (2) hours from the time at which the employee arrived at the clinic or hospital unless there are extenuating medical circumstances. Employees who notify their supervisor that they are ill when they have been informed or are anticipating they will be informed they are required to take a drug and/or alcohol test will be given prompt medical attention, which will also include a drug and/or alcohol test.

7. Test Tampering and/or Non-Compliance with Testing Procedures

In situations where it has been determined that an employee has tampered with his/her urine sample or an employee refuses or fails after reasonable opportunity to complete any step in the drug testing process, he/she will be discharged.

EMERGENCY

AMBULANCE_____

FIRE-RESCUE_____

HOSPITAL_____

POLICE_____

MBTA RESIDENT ENGINEER_____

ALTERNATE_____

(POSTING IS REQUIRED BY OSHA 1926.)

(EXHIBIT 2-2)

SAFETY STANDARDS

American Concrete Institute
American National Red Cross
American National Standards Institute
American Petroleum Institute
American Society of Mechanical Engineers
American Society for Testing Materials
American Welding Society
Associated General Contractors of America
Buildings Officials Conference of America
Department of Transportation
Federal Transportation Administration
E.I. DuPont de Nemours & Company
Federal Fire Council
Federal Safety Council
Industrial Hygiene Foundation of America, Inc.
Institute of Makers of Explosives
Interstate Commerce Commission
Massachusetts Division of Labor and Industries
National Bureau of Standards
National Fire Protection Association
National Safety Council
Occupational Safety and Health Act, U.S. Department of Labor
Underwriters Laboratories, Inc.
United States of American Standards Institute
Nuclear Regulatory Commission
U.S. Army, Corp. of Engineers
U.S. Department of Interior, Bureau of Mines
U.S. Government, General Services Administration
U.S. Urban Mass Transportation Administration

3.0 INSTRUCTION AND TRAINING

3.1 Basic Elements

The following areas of instruction and safety communication will promote satisfaction of the statuary as well as the Project requirements:

$ Indoctrinations

$ Right-of-Way Safety Awareness Assignments

$ Meetings

$ Personal Contact

$ Specific Instruction

$ Promotional Material

$ Bulletin Board

3.2 Procedures

The MBTA Safety personnel are available to assist Contractor's in carrying out their accident prevention instruction and training responsibilities.

3.2.1 Indoctrination

Newly employed, promoted and/or transferred personnel shall be fully instructed in the safety practices required by their new assignments. Initial instructions for new project personnel will include discussion of the project's basic safety regulations.

3.2.2 Right-of-Way Safety Awareness

Newly employed, promoted and/or transferred personnel shall be fully instructed in the right-of-way safety practices required by their new assignments. Personnel will not be allowed on the job site unless they have attended the Right-of-Way Safety Awareness training session. They must display the Hard Hat sticker, and carry a certification card.

3.2.3 Work Assignments

All work assignments, regardless of level, should include specific instruction on safety, especially in instances where experience or the nature of the assignment indicates the possibility of personal injury or property damage.

3.2.4 Meetings

Holding properly conducted safety meetings of reasonable length is an effective means of communicating with employees. To be effective, the material presented must be specific as well as practical.

a. **Operational or Progress Meetings**

Whether these meetings are held at a Project or Contractor level, accident prevention shall be an agenda item and the record of these meetings should reflect the specific items discussed.

b. **Crew Training Meeting**

Each Foreman shall hold a weekly safety training meeting in its work area with its entire crew. These meetings, often called "tool box" or "tail gate" meetings are ideally held on Monday morning and should usually last five to ten minutes. Subject matter should cover specific safety procedures pertinent to the crew's on-going activity. Following these meetings, "Report of Safety Meeting" Form (Exhibit 3-1) shall be completed. The Contractor's designated Safety Supervisor shall periodically attend and participate in these meetings.

3.2.5 Personal Contact

All levels of supervision shall make a specific effort to call to the attention of individuals under their direction, pertinent safety items relative to work. This personalized "on the spot" instruction is an extremely valuable training technique, as well as continuing indication of management's awareness and concern for safety.

3.2.6 Specific Instruction

OSHA's Construction Safety Standards require that varying degrees of training and instruction be afforded Project personnel engaged in specific areas of performance. Among the requirements listed are:

a. Unsafe Conditions (All Employees)

b. Use of Poison or Caustics (Exposed Employees)

c. Use of Flammable Liquids, Etc. (Employees Using)

d. Use of Respiratory Protection (As Required)

e. Gas Welding and Cutting (Employees Performing)

f. Arc Welding (Employees Performing)

g. Toxic Substance (Employees Using)

h. Hazardous Material Communication Program (All Employees)

3.2.7 Promotional Material

Posters and signs are useful means for wide dissemination of instruction and training. The value of both have been repeatedly demonstrated.

Basic safety signs are normally permanent while posters are temporary and should be changed frequently to maintain relevance with the changing job site environment.

3.2.8 Bulletin Board

The Contractor shall provide a bulletin board at the work site(s) in an area accessible to all employees. The Bulletin Board shall be utilized for the required OSHA and other MBTA distributed information, safety information and posters.

MBTA CONSTRUCTION SAFETY

"WEEKLY TOOLBOX SAFETY MEETING"

DATE:_____

MBTA CONTRACT NO._____

PROJECT:_____

CONTRACTOR:_____

CRAFT:_____

NO. ATTENDING:_____

TOPIC(S) DISCUSSED:

SUGGESTIONS FOR IMPROVEMENTS:

_____

FOREMAN'S SIGNATURE

_____

SAFETY REPRESENTATIVE

(EXHIBIT 3-1 (B)

ATTENDANCE ROSTER **DATE:**_____

	NAME (PRINTED)	SIGNATURE	CRAFT
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			

4.0 WORK PRACTICES CONTROL

4.1 Procedures

The techniques to be applied by the Contractor in the control of employee unsafe acts are identical to those that are utilized in the achievement of production quality and quantity control.

4.1.1 Supervisory Controls

a. Contractor - Each Contractor shall be responsible for continuous surveillance of its operations, so that he is aware of the probable sources of potential injury or loss due to unsafe acts or procedures.

b. Contractor Supervisor - The practical safety experience of project supervision must be utilized in directing the actions of those under their direction.

4.1.2 Project Controls

Frequent monitoring surveillance and audit of the performance of Contractors and its supervision will be made by MBTA Inspectors, Resident Engineers, the Project Safety Manager and/or its designated representative(s). In all instances, Contractors will be notified in writing of any serious unsafe practices observed. Failure to notify the Contractor shall not relieve the Contractor of its obligation to identify and correct unsafe practices. The Contractor's Safety Supervisor, the MBTA Project Safety Manager and other designated safety personnel shall utilize Exhibit 8-1, "Construction Safety Survey", to record unsafe practices and/or conditions. Instructions for completing Exhibit 8-1 are contained in Section 8.0.

4.1.3 Working On Or Near Third Rail

When working on or near the third rail, when the power is off, the contractor must have a third rail high-voltage warner device (Julian A. McDermott Corp. Mod RR4WL-WSAD-LI or MOD RRail-WSAD-LI-DP). This device will warn work crews if the third rail becomes energized at any time during work activity involving the right-of-way.

5.0 PHYSICAL CONDITIONS CONTROL

5.1 Procedures

5.1.1 Planning

It is an accepted principle of accident prevention that effective control of physical conditions must begin with planning. Many more serious accidents result from poor planning (or worse, lack of planning) than from any other cause. Planning, for the safety of personnel and for equipment being used, must begin with design and continue through Project completion. Contractors shall plan the safety procedures to be followed for each phase of construction. Planning meetings must include the involved Contractor, its responsible members of the MBTA's staff, and any other responsible party who may contribute to the safety of the operation.

Personnel chosen to perform any such planned operation shall be thoroughly instructed in all aspects of the procedure, including emergency actions to be taken in the event of a mishap.

5.1.2 Responsibility

The Contractor is ultimately responsible for effective performance under this section through its Superintendent or Foremen. This is because the Superintendent or Foreman has direct control of the work being performed. As such, he has the last opportunity to observe and correct any unsafe acts and/or conditions that may exist.

5.1.3 Inspections

There are a number of physical equipment inspections required by OSHA. One example is crane inspection: A "competent person" must be responsible for the regular inspection of cranes, including all wire rope. A written record of these inspections must be maintained on the site.

a. Contractor's Safety Supervisor

The Contractor shall ensure that its Safety Supervisor regularly inspects each of the work areas (including storage, office and shop facilities) to ensure compliance with MBTA and OSHA requirements. "Construction Inspection Check List", (Exhibit 5-1) is to be used on a weekly basis.

b. Crane Inspection Record

(Exhibit 5-2) and Wire Rope Inspection Record (Exhibit 5-3) are to be completed by the MBTA competent person prior to use on the job site.

c. Crane and Wire Rope Inspections

Shall be performed by the Contractor per OSHA requirements.

d. OSHA Compliance Officers

Contractors may expect periodic safety inspections from OSHA Compliance Officers. Contractors shall promptly notify the Resident Engineer whenever an OSHA Compliance Officer arrives on the Project.

e. Inspectors, Resident Engineers, Construction Project Manager, Safety Director, Project Safety Manager

Contractors may expect continuous surveillance, monitoring, and audit of the safety practices and procedures by the MBTA staff above. Full cooperation of the Contractor shall be given to correct in a timely manner any safety discrepancies noted verbally or in writing by the MBTA staff above. Surveillance, monitoring, and audits shall not relieve the Contractor of any of its safety obligations.

5.1.4 Information Exchange

The free flow and exchange of any information that may contribute to safe operations between the Contractor's Safety Supervisor and the MBTA staff is strongly encouraged.

5.1.5 Equipment and Facilities

Contractor operating equipment and facilities shall be used, inspected, and maintained as directed in this manual and as dictated by the applicable federal and state safety and health regulations. In the event of conflict the more stringent requirement will take precedence.

5.1.6 Notification of Hazards

Contractors shall notify the Resident Engineer/Project Safety Manager, in writing, of the existence of any hazardous conditions, property or equipment at the work site which are not under the Contractor's control. However, it is the Contractor's responsibility to take all necessary precautions against injury to persons or damage to property from such hazardous conditions until corrected by the responsible party.

5.1.7 Work Authorizations

The following work authorizations will be issued by the MBTA:

a. Excavation

b. Hotwork

c. Confined Space Entry

d. Crane-Suspended personnel platforms

Construction Safety Inspection Check List

Contractor: _____ Contract No._____
Jobsite Location: _____
Person in Charge: _____
Date:_____ Time:_____
Person(s) making inspection:
_____
_____
_____

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
(1)	PROGRAM ADMINISTRATION:			
	(a) Posting OSHA and other jobsite warning posters.			
	(b) Do you have safety meetings?			
	(c) Do you have job safety training, including first-aid training?			
	(d) Are there medical service and first-aid equipment, stretchers, and emergency vehicles available?			
	(e) Are jobsite injury records being kept?			
	(f) Are emergency telephone numbers, such as police department, fire department, doctor, hospital, and ambulance posted?			
(2)	HOUSEKEEPING AND SANITATION:			
	(a) General neatness of working areas.			
	(b) Regular disposal of waste and trash.			
	(c) Passageways and walkways clear?			
	(d) Adequate lighting.			
	(e) Projecting nails removed.			
	(f) Oil and grease removed.			
	(g) Waste containers provided and used.			
	(h) Sanitary facilities adequate and clean.			
	(i) Drinking water tested and approved.			
	(j) Adequate supply of water.			
	(k) Disposal drinking cups.			
	(b) Fire extinguishers identified, checked, lighted.			
	(c) Phone number of fire department posted.			
	(d) Hydrants clear, access to public thoroughfare			

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	open.			
	(e) Good housekeeping.			
	(f) "No smoking" posted and enforced where needed.			
	(g) Fire brigades.			
(4)	ELECTRICAL INSTALLATIONS:			
	(a) Adequate wiring, well insulated.			
	(b) Fuses provided.			
	(c) Fire hazards checked.			
	(d) Electrical dangers posted.			
	(e) Proper fire extinguishers provided.			
	(f) Are terminal boxes equipped with required covers? Are covers used?			
(5)	HAND TOOLS:			
	(a) Proper tool being used for each job.			
	(b) Neat storage, safe carrying.			
	(c) Inspection and maintenance.			
	(d) Damaged tools repaired or replaced promptly. Are employee's tools inspected and repaired?			
(6)	POWER TOOLS:			
	(a) Good housekeeping where tools are used.			
	(b) Tools and cords in good conditions.			
	(c) Proper grounding.			
	(d) Proper instruction in use.			
	(e) All mechanical safeguards inuse.			
	(f) Tools neatly stored when not in use.			
	(g) Right tool being used for the job at hand.			
	(h) Wiring properly installed.			
(7)	POWER-ACTUATED TOOLS:			
	(a) Local laws and ordinances complied with.			
	(b) All operators qualified.			
	(c) Tools and charges protected from unauthorized use.			
	(d) Competent instruction and supervision.			

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	(e) Tools checked and in good working order.			
	(f) Tools not used in any, but recommended materials.			
	(g) Safety goggles of face shields.			
	(h) Flying hazard checked by backing up, removal of personnel, or use of captive stud tool.			
(8)	LADDERS:			
	(a) Ladders inspected and in good condition?			
	(b) Properly secured to prevent slipping, sliding, or falling?			
	(c) Do siderails extend 36" above top of landing?			
	(d) Rungs or cleats not over 12" on center.			
	(e) Stepladders fully open when in use.			
	(f) Metal ladders not used around electrical hazards.			
	(g) Proper maintenance and storage.			
	(h) Are ladders painted?			
	(i) Are safety shoes in use?			
(9)	SCAFFOLDING:			
	(a) Is erection properly supervised?			
	(b) Will all structural members meet the safety factor?			
	(c) Are all connections secure?			
	(d) Is scaffold tied into structure?			
	(e) Are working areas free of debris, snow, ice, grease?			
	(f) Are foot sills and mud sills provided?			
	(g) Are workers protected from falling objects?			
	(h) Is scaffold equipment in good working order?			
	(i) Are guard rails, intermediate rails, and toeboards in place?			
	(j) Are ropes and cables in good condition?			
(10)	HOISTS, CRANES AND DERRICKS:			
	(a) Inspect cables and sheaves.			
	(b) Check slings and chains, hooks, and eves.			
	(c) Equipment firmly supported.			

		Column: A=Adequate:	B=Inadequate	
		A	B	Remarks
	(d) Outriggers used if needed.			
	(e) Power lines inactivated, removed, or at safe distance.			
	(f) Proper loading for capacity at lifting radius.			
	(g) All equipment properly lubricated and maintained.			
	(h) Signalmen where needed.			
	(i) Signals understood and observed.			
	(j) Are inspection and maintenance logs maintained?			
(11)	HEAVY EQUIPMENT			
	(a) Regular inspection and maintenance.			
	(b) Lubrication and repair of moving parts.			
	(c) Lights, brakes, warning signals operative.			
	(d) Wheels chocked when necessary.			
	(e) Haul roads well maintained and laid out properly.			
	(f) Protection when equipment is not in use.			
	(g) Are shut-off devices on hose lines in case of hose failure?			
	(h) Are noise arresters in use?			
(12)	MOTOR VEHICLES:			
	(a) Regular inspection and maintenance.			
	(b) Qualified operators.			
	(c) Local and state vehicles laws and regulations observed.			
	(d) Brakes, lights, warning devices operatives.			
	(e) Weight limits and load sizes controlled.			
	(f) Personnel carried in a safe manner - seated.			
	(g) Is all glass in good condition?			
	(h) Are back-up signals provided?			
	(i) Are fire extinguishers installed where required?			
(13)	GARAGES AND REPAIR SHOPS:			
	(a) Fire hazards.			
	(b) Dispensing of fuels and lubricants.			

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	(c) Good housekeeping.			
	(d) Lighting.			
	(e) Carbon monoxide dangers.			
	(f) Are all fuels and lubricants in proper containers?			
	(g) Proper ventilation.			
	(h) Proper grounding and bonding.			
(14)	BARRICADES:			
	(a) Flood openings planked over or barricaded.			
	(b) Roadways and sidewalks effectively protected.			
	(c) Adequate lighting provided.			
	(d) Traffic controlled.			
(15)	HANDLING AND STORAGE OF MATERIALS:			
	(a) Are materials properly stored or stacked?			
	(b) Are passageways clear?			
	(c) Stacks on firm footings, not too high.			
	(d) Proper number of men for each operation.			
	(e) Are men lifting loads correctly?			
	(f) Are materials protected from weather conditions?			
	(g) Protection against falling into hoppers and bins.			
	(h) Is dust protection observed?			
	(i) Extinguishers and other fire protection.			
	(j) Is traffic controlled in the storage area?			
(16)	EXCAVATION AND SHORING:			
	(a) Are adjacent structures properly shored?			
	(b) Is shoring and sheathing used for soil and depth?			
	(c) Are roads and sidewalks supported and protected?			
	(d) Is material stored too close to excavations?			
	(e) Is excavation barricaded and lighting provided?			
	(f) Is equipment a safe distance from edge of excavation?			
	(g) Are ladders provided where needed?			

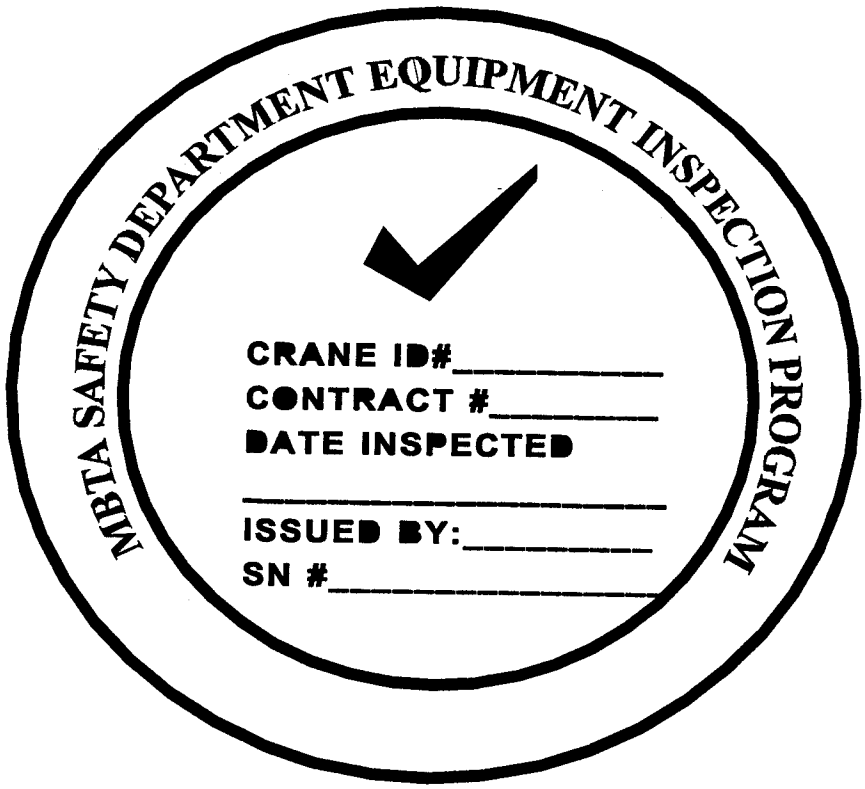
		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	(h) Are equipment ramps adequate?			
	(i) Is job supervision adequate?			
(17)	DEMOLITION:			
	(a) Are operations planned ahead?			
	(b) Is there shoring of adjacent structures?			
	(c) Are material chutes used?			
	(d) Is there sidewalk and other public protection?			
	(e) Clear operating space for trucks and other vehicles.			
	(f) Adequate access ladders or stairs.			
(18)	FILE DRIVING:			
	(a) Are there proper storage procedures?			
	(b) Is unloading only by properly instructed workmen?			
	(c) Are steamlines, slings, etc., in operating condition?			
	(d) Are piled riving rigs properly supported?			
	(e) Are ladders on frames?			
	(f) Are cofferdams maintained and inspected?			
	(g) Is adequate pumping available?			
	(h) Is man protection adequate?			
(19)	EXPLOSIVES:			
	(a) Qualified operators and supervision.			
	(b) Proper transport vehicles.			
	(c) Local laws and regulations observed.			
	(d) Storage magazines constructed per regulations or as recommended.			
	(e) Experienced personnel handling explosives at all times.			
	(f) Cases opened properly.			
	(g) "No smoking" posted and observed where appropriate.			
	(h) Detonators tested before each shot.			
	(i) All personnel familiar with signals and signals properly used at all times.			

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	(j) Inspection after each shot.			
	(k) Proper protection and accounting for all explosives at all times.			
	(l) Proper disposition of wrappings, waste, and scrap.			
	(m) Advise residents nearby of blasting cap damage, and inspect potential damage points.			
	(n) Check radio frequency hazards.			
(20)	FLAMMABLE GASES AND LIQUIDS:			
	(a) All containers clearly identified.			
	(b) Proper storage practices observed.			
	(c) Fire hazards checked.			
	(d) Proper storage temperatures and protection.			
	(e) Proper types and number of extinguishers nearby.			
	(f) Carts for moving cylinders.			
(21)	WELDING AND CUTTING:			
	(a) Are operators qualified?			
	(b) Screens and shields.			
	(c) Goggles, gloves, and clothing.			
	(d) Equipment in operating condition.			
	(e) Electrical equipment grounded.			
	(f) Power cables protected and in good repair.			
	(g) Fire extinguishers of proper type nearby.			
	(h) Inspection for fire hazards.			
	(i) Flammable materials protection.			
	(j) Gas cylinders chained upright.			
	(k) Gas lines protected and in good condition.			
	(l) Are cylinders caps in use?			
(22)	STEEL ERECTION:			
	(a) Safety nets or planked floors.			
	(b) Hard hats, safety shoes, gloves.			
	(c) Taglines for tools.			
	(d) Fire hazards at rivet forge and welding operations.			

		Column: A=Adequate: B=Inadequate		
		A	B	Remarks
	(e) Floor opening covered and barricaded.			
	(f) Ladders, stairs, or other access provided.			
	(g) Hoisting apparatus checked.			
	(h) Safe man position.			
(23)	CONCRETE CONSTRUCTION:			
	(a) Forms properly installed and braced.			
	(b) Adequate shoring, plumed, and cross braced.			
	(c) Shoring remains in place until strength is attained.			
	(d) Proper curing period and procedures.			
	(e) Check heating devices.			
	(f) Mixing and transport equipment supported and traffic planned and routed.			
	(g) Adequate runways.			
	(h) Protection from cement dust and concrete contact.			
	(i) Nails and stripped form material removed from area.			
(24)	MASONRY:			
	(a) Proper scaffolding.			
	(b) Masonry saws properly equipped, dust protection provided.			
	(c) Safe hoisting equipment.			
(25)	HIGHWAY CONSTRUCTION:			
	(a) Laws and ordinances observed.			
	(b) Competent flagmen properly dressed, instructed, posted.			
	(c) Adequate warning signs and markers.			
	(d) Equipment not blocking right-of-way.			
	(e) Traffic control through construction site.			
(26)	PERSONAL PROTECTION EQUIPMENT:			
	(a) Eye protection.			
	(b) Face shields.			
	(c) Respirators and masks.			
	(d) Helmets and hoods.			

		Column: A=Adequate:	B=Inadequate	
		A	B	Remarks
	(e) Head protection.			
	(f) Gloves, aprons, and sleeves, rubber or plastic, designed to afforded protection from alkalis and acids, electricians' rubber gloves with protectors.			

Exhibit 5-2



CRANE SAFETY INSPECTION REPORT

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

CRANE SAFETY INSPECTION REPORT

CONTRACTOR		SUB CONTRACTOR		JOB. NO.	CFSR #
ADDRESS		TELEPHONE	LOCATION	INSPECTION DATE	INSPECTION STICKER #
MANUFACTURER	CAPACITY	SER. #	MODEL #	UNIT #	TIME

OPERATOR=S INFORMATION NAME_____ LICENSE #_____ EXPIRATION DATE_____	ITEM #	SAT.	UNSAT.	N/A	DEFICIENCIES
RECORDS/SIGNS					
Current Annual Inspection Report					
Preventive Maintenance Records					
Operator's Manual/Instructions					
Marked Operator Controls					
Load Charts					
Caution or Informational Signs					
Hand Signal Chart					
High Voltage Warning Signs					
Counterweight Warning Signs					
SAFETY EQUIPMENT					
Handrails, Steps, Non-Skid Surfaces, Mirrors					
Heater/Defroster					
Windshield Wipers/Blades					
Fire Extinguisher					
Warning Devices: Back-up Alarm, Horn					
Anti-two Block System/Device					
ELECTRICAL CONTROL AND ENGINE SYSTEMS					
Electrical System					
Air Pressure System					
Hydraulic System					
Controls and Instructions: Levers, ???, Switches, Buttons and Knobs					

Holding and Locking Systems					
Indicators: Level Boom Angle/Length					
Load ?? Drum Rotation Swing/Boom Warning					
Engine Operation: Upperworks/Carrier					
Clutch and Brake Systems: Pads					
Safety and Machinery Guards					
Muffler/Exhaust System					
HYDRAULIC					
Radiator					
Boom Extension Hoses and Reel					
Hoses and Fittings					
Hoist Cylinders: Foot Pins and Seals					
Boom Sections/Base/Intermediate/Tip					
Rollers/Wear Pads					
Point Sheaves/Bearings					
Cable Keepers On All Sheaves					
Jib/Extensions					
LATTICE BOOM/JIB					
Gantry Bridle or Equalizer Systems					
Foot Connections/Pins					
Automatic Boom/Hoist Kickout					
Boom Stops					
Chords					
Lacings					
Welds					
Pins/Keepers/Lugs					
Rollers					
Cable Keepers On All Sheaves					
Sheaves/Bearings					
Jib: Connections, Hinge Pins					

LUBE SYSTEMS GAUGES						
Automatic/Manual Lubrication						
Fluid Levels						
Gauge/Gauge Ports						
DRUMWIRE ROPE HOOK/BLOCK ASSEMBLERS						
Glazing						
Superstructure: Frame, Cracks and Welds						
Steering System						
Lights: Head, Tail, and Brake						
Signal Indicators/Markers/Flashers						
Fuel Tank/Cap						
Tires: Condition/Pressure						
Wheel Lugs/Cylinders						
Cranes/Chains?? Sprockets, Hobbers and Pins						
Outriggers: Boxes, Beams, Cylinders						
Pads, Pins and Keepers						
Mounts, Bolts, Nuts, Rivets, and Brackets						
Muffler/Exhaust System						
Counterweight Hooks and Bolts						
Housekeeping/Toolbox or Storage Area						
Drums	Wedge Sockets					
Anchoring of Rope	Hends On Ball/Swivel					
Ropes Spooling on Drums	Blocks: Sheaves, Sheave					
Boom Hoist	Bearings Guard Plates					
Pendants	Swivel, Pins, and Keepers					

Main Hoist	Hook: Tram/Throad					
Auxiliary Hoist	Hook NOT					
Whip or Jib Hoist	Safety Latch					
Rope End Fittings						
All unsatisfactory wire rope shall be replaced as per original manufacturer's recommendations.						

NOTE:
As of this date _____ the unit described above has been found to be in the above condition. It is understood that this inspection does not provide?? The necessary to perform frequent and periodic inspections in conjunction with a regular maintenance program in accordance with manufacturer's specifications and/or Federal, State and local guidelines, as applicable. This inspection does not constitute a warranty or guaranty of the performance on above equipment.

EXHIBIT 5-3

MBTA

WIRE ROPE INSPECTION REPORT

CRANE NO._____ MILEAGE _____ HOURS_____ DATE INSPECTED_____

WIRE ROPE	(A) Number Broken Wires Per:	(B) Diameter reduction (wear or core damage)	(C) Kinked, Crushed, Cut, Loss of Lay, Etc.?	(D) Lubed, Corrosion, (internal or external), Heat damage?	(E) Terminal, Tackle, Blocks, Hooks, Etc.?
TYPE SIZE	(1) (2) Lay? Strand?	(1) (2) Ind. Wire Tot. Rope?			
Main Hoist (Td. Line)					
Boom Hoist (Top Lift)					
Jib Hoist (Whip Line)					
Pendants (Main)					
Pendants (150 Foot Boom)					
Jib Guys (Upper)					
Jib Guys (Lower)					

Replacement of hoisting rope shall be done in compliance with the replacement criteria by manufacturers recommendations.

INSPECTED AT LOCATION:_____ INSPECTED BY_____

COMMENTS:_____

6.0 SAFE PRACTICE STANDARDS

6.1 PROCEDURES

6.1.1 Housekeeping

A basic concept in any effective accident prevention program is "good housekeeping." No one item has a great impact on the overall success of a safety program for a construction project. The importance of good housekeeping is such that it must be planned from the beginning of the job and carefully supervised through the final cleanup.

a. During the course of construction, work areas, passageways and stairs, in an around buildings and structures, shall be kept clear of debris. Construction materials shall be stored in an orderly manner. Storage areas and walkways on the site shall be maintained free of depressions, obstructions and debris.

b. The essential elements of good housekeeping include:

1. Orderly placement of materials, tools, equipment, cords, and electric lines.

2. Placing receptacles at appropriate locations for the disposal of rubbish and debris.

3. Prompt removal and disposal of trash and waste materials.

4. Locating air and water lines, welding and burning leads, to eliminate tripping hazards.

6.1.2 Equipment Standards

Adherence to the standards listed below will aid the Contractor in the prevention of personal injury and property damage accidents.

a. **Motor Vehicles**

1. Each operator is responsible for the safe operation of its vehicle Drivers should make a daily inspection of the following: steering, brakes, mirrors, lights, horn, seat belts, backup alarm, tires and windshield wipers. Noted defects must be reported for prompt repair.

2. Preventative maintenance shall be regularly scheduled for all vehicles to assure their safe operating condition. All vehicles must be in compliance with federal and state requirements.

3. Trucks shall never be loaded beyond their rated capacities, or in a manner that will obscure the driver's vision. To prevent shifting or loss of material, all loads shall be securely fastened.

4. Motor vehicles shall be fueled only at established locations and by approved methods. When a vehicle is being fueled, smoking or open flames will not be permitted. Gasoline-powered equipment shall not be refueled while engine is

running or hot. Gasoline will only be dispersed from approved acceptable safety containers. Grounding straps shall be utilized during transfer of flammable liquids.

b. **Material Handling Equipment (Cranes)**

1. The Contractor shall notify the Resident Engineer 48 hours prior to bringing in any hoisting equipment on the Authority's property.

2. Operators are responsible for the exercise of caution necessary for the safe operation of their equipment. Operators shall immediately report unsafe conditions, including defects in the machine, to their supervisor.

3. Operators shall not permit anyone to ride the hook or load.

4. When the operator leaves its machine or repairs are being made, it is his/her responsibility to set the brakes, secure the boom, take the machine out of gear and turn off the engine.

5. When making a lift, the operator will take operational signals only from the person authorized to give them. An emergency stop signal, given by anyone, will be acted upon by the operator.

6. It is the joint responsibility of the operator and the riggers to see that all hitches are secure and that all loose material is removed before the loads are lifted.

7. Safety hooks, or properly "moused" hooks, shall be used on all operations where loads are being handled. Suspended loads shall be controlled by tag lines.

8. Booms shall be equipped with a boom angle indicator and approved boom stops. Boom heads, load blocks and hooks shall be painted with a high visibility paint.

9. Where necessary to increase stability, cranes, except crawler cranes and boom type excavators, shall be equipped with outriggers of a design and strength suitable for the work being performed. Outrigger shall be used in accordance with the manufacturers instructions.

10. Hooks, wire rope, bearings, gears, friction clutches, chain drivers and other parts subject to wear must be inspected at regular intervals and repaired or replaced as required. Records of such inspections shall be maintained by the contractor.

11. A thorough annual inspection of each crane or hoisting device shall be made by a competent person. Written records of such inspections be maintained by the contractor.

6.1.3 Electrical

a. All electrical work, installation and wire capacities shall be in accordance with the pertinent provisions of the National Electrical Code (NFPA 70-1984), unless otherwise provided by applicable regulations. (GFS or GFI's are required on all circuits)

b. All switches shall be enclosed and grounded. Panel boards shall have provisions for closing and locking the main switch and fuse box compartment.

c. Cables passing through work areas shall be covered or elevated to protect them from damage and to eliminate tripping hazards to employees.

d. Extension cords used with portable electric tools and appliances shall be heavy duty and of the three wire grounding type, and shall conform to the type and configuration required by the applicable OSHA Construction Safety Standards Part 1C.

e. Suitable means shall be provided for identifying all electrical equipment and circuits, especially when two or more voltages are used on the same job. All circuits shall be marked for the voltage and the area of service they provide.

6.1.4 "Lock-Out" "Tag-Out" Clearance Procedure

The following procedure is intended to provide a controlled method for rendering inactive electrical equipment or operating systems (including mechanical or piped) when equipment is down for any reasons, such as repair, removal or replacement of equipment and installation of new equipment.

This procedure includes the three basic phases of work on any system:

a. Shutting down equipment

b. Repairing or installing equipment

c. Start-up equipment

It is likely that some situations will not include all three phases as such; however, regardless of the operation and the phase or phases involved, the "lock-out" "tag-out" clearance procedure must be observed to ensure that safety of the operation.

It is pointed out that even though this procedure generally provides for locking and tagging of equipment, the danger tag along is to be considered a lock-out device and any equipment bearing such a tag shall not be operated under any circumstances.

Prior to starting any major operation which would involve locking and tagging procedures, a meeting should be set up involving the Contractor's Safety Supervisor and the Cognizant MBTA Representative. Specific procedures should be adopted and reviewed by all concerned with the operation prior to commencement of work

a. Shutdown of Equipment or System

1. The Foreman shall cause equipment to be shut down in a manner consistent with good operating practice.

2. The main disconnect shall be opened in addition to any remote control switches. On electrical work, it is advisable as a further precaution that the electrician shall remove all of the supply fuses. On piped hydraulic/pneumatic systems, the main valves shall be closed, pressures relieved and blocked before initiating repair or maintenance.

3. After assuring himself that the equipment has been properly shut down in accordance with prescribed procedures, the craft supervisor shall positively determine that the equipment or system has been locked and tagged as follows:

   $ Tags shall be affixed in a clear view (signed and dated).

   $ Padlocks, to which only the craft supervisor shall have access keys, shall be placed on the equipment in such a manner as to render operation of the equipment impossible.

   $ If a shutdown is ordered by the MBTA, custody of keys will be by the MBTA only.

b. Repair or Installation

1. Each individual craftsman assigned to the repair or installation shall attach to the equipment or system a separate standard danger tag. The tag shall be dated and signed. Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area in order to be effective.

2. The craft supervisor responsible for the work must assure that the equipment has been deactivated and properly tagged before permitting its personnel to perform any work.

c. Starting Up Equipment or System

1. As soon as the work is completed, the tags shall be removed only by the individuals installing them.

2. In the event the shift ends before the work is completed, the status of the work is to be reported in detail to the oncoming shift Superintendent/Manager/Supervisor and the names on the tags jointed hanged.

3. Upon completion of the work, the supervisor will make certain all worker's tags have been moved and that everyone is clear of the equipment or system. Return the equipment to normal operating conditions.

d. General

1. In an emergency, the Contractor's Project Manager/Superintendent shall have the authority to remove the tags and locks only after positively determining whether or not the equipment or system is safe for operation and that all personnel are in the clear.

2. Personnel deviating from these instructions or unauthorized persons removing danger tags shall be subject to immediate dismissal.

6.1.5 Tools

All hand tools, power tools and similar equipment, whether furnished by the Contractor or the employee, shall be maintained in a safe condition. Supervisors and craft employees shall be responsible for the inspection and repair of tools under their control. The use of many tools requires the use of a variety of personal protective equipment. See OSHA for specific requirements.

a. Hand Tools

1. Insulated or non-conducting tools should be used when working near energized electrical circuits.

2. Tool handles should be tightly fitted. Wooden handles should be carefully checked; tightened with wedges, if necessary, and replace split or splintered handles.

3. All impact tools, such as chisels, punches and wedges shall be regularly dressed to eliminate "mushrooming."

b. Power Tools

The majority of power tools accidents are caused by improper handling or poor maintenance. The following applies to all types of power tools.

1. Only authorized personnel should be permitted to operate or repair power tools.

2. Maintenance of power tools should be systematic. All worn or damaged tools should be promptly repairs or replaced. All tools should be cleaned, tested and inspected regularly.

3. Power tools shall not be used if safety equipment, such as shields, tools rests, hoods and guards have been removed or otherwise rendered inoperative.

4. Employees using tools under conditions that expose them to the hazards of flying objects or harmful dusts shall be provided with the requires personal protective equipment.

5. All electrically powered tools shall be properly grounded.

6. Gasoline powered tools shall not be used in unventilated areas. Gasoline shall be dispensed only in U.L. approved safety cans. No gasoline powered tools shall be used in the tunnel areas during revenue hours, and they must be removed prior to beginning revenue service (storage of flammable material is prohibited).

7. Portable grinders should be provided with hood type guards with side enclosures that cover the spindle and at least 50% of the wheel. All wheels should be inspected regularly for signs of fractures.

8. Bench grinders shall be equipped with deflector shields and side cover guards. Tools rests shall have a maximum clearance of 1/8 inch from the wheel.

9. Hoses supplying pneumatic tools shall have coupling secured to prevent accidental disconnection.

10. Air supply lines should be protected from damage, inspected regularly and maintained in good condition.

11. Air sources supplying hoses exceeding 1/2 inch ID shall be protected by excess flow valves to prevent "whipping" in the event of hose separation or failure.

12. The pressure of compressed air used for cleaning purposes must be reduced to 30 psi or less (does not apply for cleaning for forms, etc.).

13. The use of compressed air for cleaning purposes is encouraged, so as to reduce the employee exposure to potential airborne contaminants.

c. Powder-Actuated Tools

1. Only employees who have furnished evidence of having been trained in its use shall be allowed to operate a powder-actuated tool. Eye protection shall be worn by all personnel using the tool.

2. Tools shall not be loaded until just prior to use. Loaded tools shall not be left unattended.

3. Tools shall not be used in an explosive or flammable atmosphere. Cartridges (powder source) shall be kept separated from all other material.

4. Powder actuated tools used on this project shall meet all applicable requirements of ANSI A10.3-1970.

6.1.6 Welding and Cutting

a. Welding

1. A suitable, approved fire extinguisher shall be available for instant use in locations where welding is done. Screens, shields or other safeguards should be provided for the protection of personnel or materials below or otherwise exposed to sparks, slag, falling objects or the direct rays of the arc.

2. The welder shall wear approved eye, head protection, gloves and respirators if required. Persons assisting the welder shall wear protective glasses and respirator if required.

3. Electric welding equipment, including cable, shall meet the requirements of the National Electric Code. Welding practices shall comply with all applicable regulations.

b. Burning or Cutting

1. When gas cylinders are stored, moved or transported, the valve protection cap shall be in place.

2. When cylinders are hoisted, they shall be secured and upright in an approved cage or basket.

3. All cylinders shall be stored, transported and used in an upright position. If the cylinder is not equipped with a valve wheel a key shall be kept on the valve stem while in use. Gas cylinders must be stored 20 feet from propane.

4. An approved fire extinguisher shall be readily available in the event of fire.

5. Appropriate personal protective equipment, such as burning glasses, shields and/or gloves must be used.

6.1.7 Ladders

a. Manufactured Ladders

Manufactured ladders on the project shall comply with the regulations of ANSI A14.1-1990, Safety Code for Portable Wood Ladders or ANSI A14.2-1990, Safety Code for Portable Metal Ladders are required by OSHA.

1. Ladders with broken or missing rungs, broken or split side rails, or otherwise damaged, shall not be used.

2. All portable ladders shall be equipped with non-skid safety feet and shall be placed on a stable base. The access areas at the top and bottom of ladders shall be kept clear.

3. The side rails shall extend 36 inches above the landing. When this is not practical, grab rails shall be installed. All ladders in use shall be tied, blocked or otherwise secured to prevent accidental displacement.

b. Job Made Ladders

1. Job made ladders shall be fabricated in compliance with OSHA 1926 Subpart X.

2. The general rules applying to the use of manufactured ladders also apply to the use of job made ladders.

6.1.8 Scaffolding

a. 1. Scaffolds should be designed, built and inspected by competent persons. To avoid the use of makeshift platforms and scaffolding, each job should be carefully planned to assure that scaffolding is used where required and that such scaffolding conforms to its length and be made of at least 2 inch by 4 inch stock or its equivalent.

2. Guard rails shall be installed on all open sides and ends of platforms more than six feet (6') above the ground or floor and shall be approximately forty two inches (42") high. Guard rails shall be made of lumber not less than two inches (2") by four inches (4") material.

3. The midrail shall be halfway between the top rail and the floor, runway, platform or ramp. The ends of the rail shall not overhang the terminal posts except when it does not constitute a projected hazard. The midrail shall be made of at least 1 inch by 6 inch stock or its equivalent.

4. The toeboard, 4 inch minimum height, shall be securely fastened in place.

5. Wooden Railing Posts (verticals) shall be made of at least 2 inch by 4 inch stock or its equivalent, and be spaced so as not to exceed 8 feet on center.

b. Other types, sizes and arrangements of railing construction are acceptable, provided they meet the following requirements:

1. A smooth surfaced top rail approximately 42 inches above the floor.

2. A strength to withstand the minimum of 200 lbs. applied within two inches (2") of the top edge in any downward or outward direction at any point along the top edge

3. For specific material requirements, refer to current OSHA Standards 1926 Subpart L.

c. Stair Railings

A stair railing shall be constructed similar to a standard railing, but the vertical height shall be not more than 34 inches nor fewer than 30 inches from the top rail to the surface of the tread in line with the face of the riser at the forward edge of the riser. All hand rails shall be provided with a clearance of approximately three inches (3") between the hand rail and any other surface or object.

d. Covered Floor Opening

Floor opening covers shall be capable of supporting the maximum intended load and so installed as to prevent accidental displacement. Covers on larger floor openings shall be distinctively marked.

e. Stairways

During construction, stairs shall be provided on all structures that are two or more floors or more than 20 feet in height.

1. Stairway placement should follow as soon as practical.

2. All parts of stairways shall be free of hazardous projections. Debris and other loose material shall not be allowed to accumulate on stairways.

3. Permanent steel stairways having hollow pan type treads and landings that are to be used prior to concrete placement shall have the pans filled with solid material to the level of the nosing.

4. Temporary stairs shall have a landing not fewer than 30 inches wide, in the direction of travel, for every 12 feet of vertical rise. Wooden treads for temporary service shall be full width.

5. Riser height and tread width shall be uniform throughout any flight of stairs.

6.1.9 Concrete and Concrete Forms

All equipment and materials used in concrete construction and masonry work shall meet the applicable requirements as prescribed in ANSI A10.9-1970 "Safety Requirements for Concrete Construction and Masonry Work."

a. Employees working more than 6 feet above any adjacent working surface, placing reinforcing steel in walls, piers, columns, etc. shall be provided with fall protection such as a safety harness or equivalent device

b. Employees shall not be permitted to work above vertically protruding reinforcing steel unless such steel has been protected to eliminate the implement hazard.

c. The riding of concrete buckets for any purpose shall be prohibited.

6.1.10 Floor and Wall Openings

To control conditions where there is danger of employees of materials falling through floor, roof or wall openings, such openings shall be protected by standard railings and toeboards or covered over as follows:

a. A standard railing shall consist of a top rail, intermediate (midrail) rail, toeboard and posts.

1. The top rail shall be approximately 42 inches from the upper surface of the rail to the floor, platform or ramp level. The top rail shall be smooth surfaced throughout.

6.1.11 Steel Erection

a. Permanent floors shall be installed as soon as practical following the erection of structural members. At no time shall there be more than four floors or 48 feet of unfinished bolting or welding above the foundation or uppermost secured floor.

b. Temporary Flooring

1. The erection floor shall be solidly planked over its entire surface except for access openings. Planking shall be not fewer than 2 inches thick, full size undressed, and shall be laid tight and secured against movement.

2. On structures not adaptable to temporary floors, safety nets shall be installed and maintained whenever the potential fall distance exceeds two stories or 25 feet.

3. A safety railing shall be installed, approximately 42 inches high, around the periphery of all temporary planked floors during structural steel erection.

c. General Requirements

1. Bundles of sheets or small material shall be so secured as to prevent their falling.

2. When setting structural steel, each piece shall be secured with not fewer than two bolts at each connection and drawn up wrench tight before the load is released.

3. 100% full protection is a mandatory project requirement. Avoid walking on the top flange of beams. Beams must be "cooned", using the lower flange. When engaged in work from a fixed position, a safety harness shall be used.

4. When loads are being hoisted, avoid walking under the lift or permitting an employee to be exposed to the swing of the lift.

5. A tag line shall be used to control all loads.

6. For the protection of other crafts on the project, signs shall be posted in the erection area, "Danger Men Working Overhead."

6.1.12 Excavations, Trenching and Shoring

a. The determination of the angle of repose and design of the supporting system shall be based on careful consideration of the following: depth of the cut; anticipated changes in the soil due to air, sun and water; and ground movement caused by vehicle vibration of blasting, and earth pressures.

b. Trenches 5 feet and over in depth shall be shored or walls cut back to protect employees from cave-ins.

c. Ladders or other means of egress shall be provided in each excavation. No more than 25 feet of lateral travel shall be required to reach any such ladder.

d. Soil piles must be kept back 2 feet from excavation.

e. Contractor must ensure that at a minimum for any excavation or open trench on MBTA property, a snow fence must be installed and maintained by the contractor at all times. Caution tape on any open excavation is not a sufficient barrier.

6.1.13 Personal Protection Equipment

This section establishes the minimum requirements of personal protective equipment to be used. Only equipment complying with OSHA Safety Standards shall be used. All Contractors shall be responsible for the compliance by their employees. The Contractor's Safety Coordinator shall make regular field inspections to audit compliance.

a. Head Protection

Hard hats shall be mandatory. Hard Hats shall meet the requirements of ANSI Z89.1 or ANSI Z89.2, as appropriate, as specified by OSHA 1926 Subpart E.

b. Eye Protection

When working on or visiting the project, all employees or visitors shall wear eye protection. Eye and face protection shall meet the requirements of ANSI Z87.1 as specified by OSHA 1926 Subpart E.

c. Respiratory Protection

Respiratory protection devices approved by the National Institute of Occupational Safety and Health (NIOSH) shall be supplied by the Contractor and worn by all employees when exposed to hazardous concentrations of toxic or noxious dust, fumes or mists as required by OSHA regulations.

d. Hearing Protection

Approved hearing protection shall be made available by Contractors, and such protection shall be worn by all employees exposed to sound levels in excess of OSHA's Permissible Exposure Limits (PEI).

e. Safety Harnesses

Safety harnesses meeting OSHA safety standards shall be made available by the contractor and shall be worn by all employees exposed to falls from and unprotected height of six feet or more. Safety harness lanyards shall be a minimum of 1/2 inch nylon or equivalent with a maximum length to provide for a fall of no greater than six feet.

f. Safety Shoes

While the Contractor may not be responsible for furnishing safety shoes to its employees, the Contractor is required to assure that its employees wear suitable work shoes on the project. No tennis, canvas shoes of any kind will be permitted.

g. Other Personal Protective Equipment

Other such required equipment to be used under unusual circumstances, such as high temperature work, handling corrosive liquids, etc., not specifically covered in this section shall be reviewed with the Safety Director.

h. Maintenance

Personal protective equipment which has been altered in any manner so as to reduce its effectiveness shall be repossessed, repaired or destroyed. Personal protective equipment which has been worn or used previously shall not be reissued to another employee until the article has been cleaned and sterilized.

6.1.14 Blasting

The "Blaster's Handbook" by E.I. DuPont is an excellent guide in the use, storage and handling of explosives. Only qualified personnel shall transport, handle or use explosives. For specific blasting requirements, refer to OSHA 1926 Subpart U.

6.1.15 Fire Prevention

Fire prevention is of special importance during construction. There are considerably more hazards present during construction that will be present in the completed facility. Constant attention to the fundamentals of fire prevention is vital. The Contractor's Safety Representative shall make fire hazard inspections of the entire project on a regular basis. Immediate correction of substandard conditions is mandatory.

a. Provide sufficient quantities of portable fire extinguishers appropriate for the type of possible fire, at the work area. Where hose lines are available, connect them so they are ready for service.

b. Particular care shall be taken when welding and cutting in locations where combustibles are exposed. When such welding or cutting is done, the surrounding area must be protected with fire retardant blankets, and an adequate number of approved fire extinguishers must be immediately available.

c. The operation and maintenance of temporary heating equipment shall create no fire hazards. The use of solid fuel salamanders shall be prohibited. Clothing must not be dried by placing on or near heaters.

d. All flammable and combustible materials shall be stored, piled and handled with due regard to their fire characteristics. Flammable liquids must be stored in an approved manner, and dispensed only in acceptable safety containers. Welding gases shall be stored and segregated by type of gas. Lumber should be stacked in small piles that are interspersed with wide aisles. Lumber storage should be as far as possible from any structure.

e. Temporary shacks or similar structures shall be constructed of fire resistant materials.

f. Rubbish and debris shall not be allowed to accumulate.

6.2 HOT WORK REQUIREMENTS

6.2.1 Description

This section specifies "Hot Work" fire control procedures for Contractors and their personnel, including cutters, welders and operators of heating equipment. Hot Work is any work that utilizes or produces an ignition source.

6.2.2 Submittals

a. Perform "Hot Work" operations as follows:

1. Ensure the safe handling of "Hot Work" equipment and the safe use of the particular "Hot Work" process.

2. Determine the combustible materials and hazardous areas present or likely to be present in the work locations.

3. Protect combustibles from ignition by the following.

   a. Have work moved to a location free from dangerous combustibles.

   b. If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustible properly shielded against ignition.

4. Give notice to the Project Office of the need to perform "Hot Work" operations and secure authorization from the Resident Engineer and the local fire department as applicable.

5. Ensure that the cutter or welder secures his or her supervisory's approval that conditions are safe before going ahead with the work.

6. Ensure that fire protection and extinguishing equipment are properly located at the site.

7. Where fire watchers are required, see that they are available at the site.

8. Procure all required permits.

b. Ensure the worker handles the "Hot Work" equipment safely and uses it so as not to endanger lives or property and:

1. Has the approval of his or her supervisor and the MBTA Project Office starting any "Hot Work";

2. Does not perform any "Hot Work" where conditions are not safe;

3. Continues to perform "Hot Work" only so long as conditions are unchanged from those under which approval was granted.

6.2.3 Fire Prevention Precautions

Permit "Hot Work" only in areas that are or have been made firesafe. Within the confines of a building or other enclosed structure, perform cutting and welding operations preferably in a specific area designed or approved for such work, such as a maintenance shop or a detached outside location. Ensure that such areas are of non-combustible or fire-resistant construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. When work cannot be moved practicably, as in most construction work, make the area firesafe by removing combustibles or protecting combustibles from ignition sources.

a. Do not permit "Hot Work" in the following situations:

1. In areas not authorized by the MBTA;

2. In sprinklered buildings while such protection is impaired;

3. In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts;

4. In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulphur, baled paper or cotton.

b. Before "Hot Work" is permitted, the Resident Engineer will give notification authorizing the "Hot Work" and designate precautions to be followed. He will have designated MBTA personnel to inspect the work area for fire safety, as indicated herein, and which personnel will complete a "Hot Work" check off list. The Resident Engineer will also assure himself of the following:

1. The "Hot Work" equipment to be used is in satisfactory operating condition and in good repair.

2. Where there are combustible materials such as paper clippings, wood shavings or textile fibers on the floor, sweep the floor clean for a radius of 35 feet. Keep combustible floors wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, protect personnel operating arc welding or cutting equipment from possible shock.

3. Where practicable, relocate combustibles at least 35 feet from the work site. Where relocation is impracticable, protect combustibles with flame-proofed covers or otherwise shield with metal or fire-resistant guards or curtains. Secure edges of covers at the floor so they are tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile.

4. Tightly cover wall or floor openings or cracks within 35 feet of the site to prevent the passage of sparks to adjacent areas.

5. Suitably protect or shut down ducts and conveyor systems that might carry sparks to distant combustibles.

6. Where "Hot Work" is down near walls, partition, ceiling or roofs or combustible construction, provide fire-resistant shields or guards to prevent ignition. If welding is to be done on a metal wall, partition, ceiling or roof, take precautions to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, provide a fire watch on the opposite side of the work. Do not attempt welding on a metal partition, wall, ceiling or roof having a combustible covering, nor on walls or partitions of combustible sandwich-type panel construction.

7. Do not undertake to perform "Hot Work" on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs if the work is close enough to cause ignition by conduction.

8. Provide sufficient quantities of portable fire extinguishers, appropriate for the type of possible fire, at the work area. Where hose lines are available, connect them so they are ready for service.

9. Suitably protect nearby personnel against heat, sparks, slag, etc.

c. Require the services of Fire Watcher whenever "Hot Work" is performed in locations where other than minor fire might develop, or where the following conditions exist:

1. Appreciable combustible material in the building construction or contents is closer than 35 feet to the point of operation.

2. Appreciable combustibles are more than 35 feet away, but are easily ignited by sparks.

3. Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

4. Combustible materials are adjacent to the opposite end of metal partitions, walls, ceilings or roofs, and are likely to be ignited by conduction or radiation.

Fire Watcher's responsibilities include:

1. Have fire extinguishing equipment readily available and be trained in its use.

2. Be familiar with facilities for sounding an alarm in the event of a fire.

3. Watch for fires in exposed areas, and try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm.

4. Maintain a fire watch for at least one-half hour after completion of "Hot Work" operations to detect and extinguish possible smoldering fires.

d. Where a Fire Watch is not required, make a Final Check-Up one-half hour after the completion of "Hot Work" operations to detect and extinguish possible smoldering fires.

e. Have "hot tapping" operations or other cutting or welding on a flammable gas or liquid transmission or distribution utility performed only by a crew qualified to make hot taps.

6.3 CONFINED SPACE ENTRY PROCEDURE (CSEP)

6.3.1 Purpose

This confined space entry procedure (CSEP) has been designed with the objective of preventing serious physical injury or death caused by employees attempting to perform work in confined space areas without proper testing and evaluation being performed. Contractors shall ensure that their employees and supervisors are trained in this procedure and that it is used where appropriate.

6.3.2 Confined Space Identification

A key element is CSEP is to identify areas that are considered confined spaces. A confined space is any area that:

a. has limited openings for entry and exit;

b. which may contain or produce toxic air contaminants;

c. has a high concentration of an inert gas;

d. is not intended for continuous occupancy; and

e. may have an oxygen deficient atmosphere (less than 19.5%)

Examples include, but are not limited to, storage tanks, process vessels, pits, vats, vaults, sewers, tunnels, manholes, cells, ducts, and rooms with less than proper size openings for easy access with no mechanical ventilation.

6.4 Responsibilities

Confined space areas must be evaluated prior to employee entry by supervision and/or qualified safety personnel. Once the evaluation is complete, supervision will draft its plan for ensuring that the elements of the CSEP are met.

6.4.1 Implementation and Pre-Entry Requirements

Personnel shall not enter the confined space area until the following are accomplished:

a. Lines which may convey flammable, injurious, or incapacitating substances into the space shall be disconnected, blinded or blocked off by other positive means to prevent the development of dangerous air contamination and/or oxygen deficiency within the space.

The disconnection or blind shall be so located or completed in such a manner that inadvertent reconnection of the line or removal of the blind are effectively prevented. (See lockout tagout procedures).

b. The confined space shall be emptied, flushed or otherwise purged of flammable, injurious or incapacitating substances.

c. Qualified Contractor personnel shall test the atmosphere with an approved calibrated device to determine whether dangerous contaminants and/or oxygen deficiency exists. Written records of such testing results shall be made and posted adjacent to the identified confined space. The date, time, and the name of the testing official shall also be recorded. Contractor personnel who may either be supervision of safety personnel shall perform these tests on an "as needed" basis. Records of these tests must remain a permanent record of construction site operations.

d. Where interconnected spaces are blinded off as a unit, each space shall be tested, results recorded, and the most hazardous conditions found shall govern the operation.

e. If dangerous air contamination and/or oxygen deficiency does not exist within the space, as demonstrated by the tests, entry into and work within the space may proceed subject to the following provisions:

1. Frequent testing shall be conducted to ensure that a dangerous air contamination and/or oxygen deficiency does not develop during the performance of any operation.

2. If this does occur during the operation, the requirements covered in "Confined Space Operations" shall apply.

3. Where the existence of either dangerous air contamination and/or oxygen deficiency is demonstrated by tests, existing ventilation shall be augmented by appropriate means (usually additional ventilation).

4. When additional ventilation has removed the dangerous air contamination and/or oxygen deficiency as demonstrated by additional tests (and recorded), entry into and work within the space may proceed.

f. No source of ignition shall be introduced until the implementation of appropriate provisions has ensured that dangerous air contamination due to flammable and/or explosive substances does not exist.

g. Whenever oxygen-consuming equipment such as salamanders, plumbers, torches, or furnaces and the like are to be used, measures shall be taken to ensure adequate combustion air and exhaust gas venting.

h. To the extent feasible, provision shall be made to permit ready entry and exit.

i. Where it is not feasible to provide ready exit from spaces equipped with automatic fire suppression systems employing harmful design concentrations of toxic or oxygen-displacing gases, or total foam flooding, such systems shall be deactivated. Where it is not practical or safe to deactivate such systems, the provisional of "Confined Space

Operations" related to the use of self-contained breathing equipment shall apply during entry into work within such spaces.

Contractors Must Remember:

Surveillance of the surrounding areas must be considered to avoid drifting vapors from tanks, piping and swears which might adversely affect the atmosphere of the confined space, and Respirators are of no use in an oxygen-deficient atmosphere. Either an air-line respirator or self-contained breathing equipment is effective for use in an oxygen-deficient atmosphere.

6.4.2 Requirements, Confined Space Operations

Contractor personnel shall not be allowed to enter a confined space with an oxygen deficient of potentially toxic/explosive atmosphere, except for emergency or rescue personnel as directed by the Contractor's Safety Representative.

6.4.3 Entry Into and Work Within Confined Spaces

a. Tanks, vessels, or other confined spaces with side and top openings shall be entered from side openings when practicable.

Note: Side openings are those within 3 and 1/2 feet of the bottom.

b. Approved respiratory protective equipment shall be provided and worn when needed; this equipment may include self-contained breathing equipment.

c. An approved safety harness with attached line shall always be used. The free end of the line shall be at secured outside the entry opening. The line shall be at least 1/2 inch diameter and 2,000 pounds test.

d. At least one employee shall stand by on the outside of the confined space, ready to give assistance in case of emergency. At least one additional employee who may have other duties shall be within sight of call of the standby employee(s).

1. The standby employee shall have appropriate, approved respiratory equipment which may include an independent source of breathing air, and adequate communications.

2. The standby employee shall be equipped with an emergency light source.

3. A standby employee(s), protected as prescribed, may enter a confined space. In case of emergency, the employee must alert an additional employee of the pending emergency, and the standby employee's intention to enter the confined space.

e. When entry must be made through a top opening, the following requirements shall apply:

1. The safety belt shall be of the harness type that suspends a person in an upright position.

2. A hoisting device or other effective means shall be provided for lifting employees out of the space.

f. Work which involves the use of a flame, arc, sparks, or other sources of ignition is prohibited within a confined space (or any adjacent space having common walls, floor or ceiling with the confined space) which contains, or is likely to develop, dangerous air contamination due to flammable and/or explosive substances, i.e., repair of gas tanks, etc.

g. Whenever gases such as nitrogen are used to provide an inert atmosphere for preventing the ignition of flammable gases or vapors, no flame, arc, spark or other source of ignition shall be permitted unless the oxygen concentration is maintained at less than 20% of the lower explosive limit (LEL). Contractor and Subcontractor's supervision must be aware of operations of this description.

1. Atmosphere testing shall be conducted by a competent subcontract person with sufficient frequency to ensure conformance with this paragraph.

2. A written record of the results of such testing shall be made and a copy posted adjacent to the confined space.

h. Only approved lighting and electrical equipment (12 volt, explosion-proof) shall be used in confined spaces subject to dangerous air contamination by flammable and/or explosive substances.

i. Employees working in confined spaces which had contained substances corrosive to the skin or substances which can be absorbed through the skin shall be provided with, and shall be required to wear, appropriate personal protective clothing.

j. An effective means of communication between standby employees and employees in a confined space shall be provided and used whenever the provisions of confined space operations require the use of respiratory protective equipment or whenever employees inside a confined space are out of sight of the standby employee(s). All affected employees shall be trained by the Contractor in the use of such communications system. The system shall be tested before each use to confirm its effective operation.

7.0 HAZARDOUS SUBSTANCES/COMMUNICATIONS

7.1 Purpose and Scope

The purpose of this section is to establish a procedure for the identification and notification of hazardous substances as provided under the OSHA CFR 1926 Safety and Health Regulations for Construction.

7.2 General Requirements

7.2.1 Any Contractor who uses substances on the hazardous substances list to which workers might be exposed under either normal work conditions or reasonable foreseeable emergency conditions resulting from work place operations must provide those workers with the required hazardous substance information.

7.2.2 Contractors must provide their employees, upon request, information based on the Material Safety Data Sheet (MSDS) and a copy of the MSDS. (Note: MSDS must be readily available at the job site).

7.2.3 Contractors are required to train employees to work safely with hazardous substances to include informing them what an MSDS is and where they are located.

7.2.4 Contractors are required to adhere to current minimum MBTA contract work practice requirements for the removal, containment, recovery and disposal of lead based paint, and associated waste.

7.3 Reporting of Hazardous Substances

Each Contractor working on MBTA projects is required to provide the MBTA with a list of hazardous substances and copies of the MSDS that they will be using in their work site operations. Contractors are required to provide a copy of their training program to the Safety Director for review.

8.0 OCCUPATIONAL SAFETY AND HEALTH ACT 1926 SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

8.1 OSHA

Employees must comply with current OSHA Safety Standards that apply to their type of business. All employers must meet reporting requirements and employers with eleven (11) or more employees must meet recordkeeping requirements specified in booklet "Recordkeeping Requirements Under Occupational Safety and Health Act."

8.2 Familiarization with OSHA Safety Standards

Each Contractor must be familiar with Occupational Safety and Health Act (OSHA) as it pertains to its work responsibility.

8.3 Reporting of Fatal/Serious Accidents to OSHA

All fatality cases and/or serious accidents and illness shall be reported to OSHA immediately by phone to an Occupational Safety and Health Area Office. Employers must report immediately all blasting accidents.

8.4 OSHA Poster

Part of the OSHA requirements is that each employer must post in a prominent location the "Safety and Health Protection on the Job" poster. The poster briefly states the intent and coverage of the Act. Failure to post this document is a citable offense under the Act.

EXHIBIT 8-1

CONSTRUCTION SAFETY SURVEY FORM

1. This form is required for recording any unsafe condition and/or action noted by the Contractor's Safety Supervisor, and the MBTA Safety Manager.

2. This form is primarily intended for preparation and use by the Contractor's Safety Supervisor, who is appointed to perform safety audit services in accordance with the requirements of the MBTA Construction Safety Program. Unsafe conditions and/or actions should be corrected immediately and duly reported on this form.

3. Completed copies indicating action taken and date completed shall be submitted to the MBTA Safety Project Manager.

4. This form shall also be used by the MBTA Project Safety Manager to record any unsafe action and/or condition noted. The MBTA Project Safety Manager will make known his recommendations to the Contractor's Safety Supervisor and/or Project Manager/Superintendent for immediate corrective action.

5. This form shall be used by the representatives performing safety audit services on all projects. They shall prepare this form, noting all unsafe acts and/or conditions observed during field audits. These reports shall be distributed as noted on Exhibit 8-1.

Exhibit (8.1)

CONSTRUCTION SAFETY SURVEY

Report No.:_____
Contract No.:_____
Contractor No.:_____

FILE NO.	DESCRIPTION	SAFETY REGULATION REFERENCE	ACTION AND/OR DATE COMPLETED

SURVEY MADE BY (PRINT):		DISTRIBUTION
_____ Signature _____ Title _____ Date	_____ Signature of contractor's Project Manager/Superintendent Date:_____ _____ Signature of MBTA Resident Engineer Date:_____	☙ Project Mgr./Superintendent ☙ Resident Engineer ☙ Project Safety Manager ☙ Project Risk Mgmt. Consultant ☙ MBTA Chief of Design and Construction

EXHIBIT 8-4

SUPERVISOR'S REPORT OF ACCIDENT/UNUSUAL OCCURRENCE

1. This form shall be submitted by the Contractor to the MBTA Resident Engineer for each job-related accident involving any of the following:

   a. Any injury to an employee of the Contractor or any Subcontractor.

   b. Any injury to persons not directly connected with the project (including any alleged injuries reported by a member of the general public).

   Submittal shall be made as soon as possible, but in no case later than twenty-four (24) hours after the accident. Pertinent facts which are not available within the above time shall be submitted as soon as available in a supplemental report.

SAFETY DEPARTMENT
CONSTRUCTION PROJECT ACCIDENT/INCIDENT
FIRST REPORT

Project Number_____

Contract Description_____

	Name of Injured:
	Employer:
	Job Title:
Location:	Type of Accident:
Type:	Type of Injury:
Name:	Witness(es):

Person(s) Injured:

DESCRIPTION OF ACCIDENT/INCIDENT: *(Attach additional sheets if necessary)*

PREVENTION RECOMMENDATIONS:

PREPARER'S NAME:	PREPARER'S TITLE:
PREPARER'S SIGNATURE:	PREPARER'S PHONE:

COPY TO SAFETY DEPT. FAX #(617) 222-5127 *and* CONSTRUCTION DEPT. FAX #(617) 723-1969

Forward copies of additional reports to:

MBTA Safety Department
10 Park Plaza
Room #8350
Boston, MA 02116
Attn: Mgr. Of Industrial, Construction,
Safety & Design

MBTA Design & Construction Department
10 Park Plaza
Room #6720
Boston, MA 02116
Attn: Chief of Design and Construction

SUPERVISOR'S REPORT OF ACCIDENT/UNUSUAL OCCURRENCE

1. Contract Number
2. Date of Accident - Time (AM or PM)
3. Project Section
4. Location of Accident
5. Reporting Organization
6. Contractor or Subcontractor Involved
7. Injury 8. Damage*
   __Reportable __Lost Time __Fatal __Fire __Property __Equipment
9. Injured person and address
10. Occupation of Injured
    __Male __Age __Female
    Employer
    Address
11. Nature of Injury
12. Date stopped work
13. Date Returned
14. First aid by
15. Ambulance
16. Hospital
17. Attending Physician
18. Witnesses or persons responding, including addresses
19. Fire Department
20. Police Department
21. Equipment and/or materials involved
22. Primary cause of accident
23. Secondary cause
24. Contributing factors
25. Supervisor's corrective action Supervisor's signature
26. Project Supt.'s corrective action Project Supt.'s signature
27. Date this report *Attach a list of damaged property and/or equipment excluding motor vehicles. Indicate Owner's names and addresses.
28. MBTA safety regulations involved Part_____Chapter_____ Par. _____
29. OSHA regulations involved Part_____ Chapter _____ Par. _____
30. Photographs attached_____
31. Sketch showing location of nearby structures, materials, equipment, etc., with approximate scale of distances.
32. Narrative description of events previous, during and immediately after the accident.

EXHIBIT 8-5

MONTHLY ACCIDENT EXPERIENCE SUMMARY

1. This form shall be submitted monthly by the Contractor to reflect the cumulative accident experience of the Contractor and each Subcontractor.

2. This report must be submitted no later than three (3) days after end of the month being reported.

3. These report forms and their completion do not, in any way, relieve the Contractor from completing OSHA Form 200 or Employers Report of Occupational Injury or Illness.

MBTA Contract No.
CONTRACTOR/SUBCONTRACTOR Name:
MONTH YEAR
REPORTING PERIOD: THROUGH

MONTHLY
ACCIDENT EXPERIENCE SUMMARY

	THIS MONTH	YEAR TO DATE	PROJECT TO DATE
Hours Worked First Aid Cases			
A. OSHA Recordable Cases B. Lost Time Cases (List each under comments) C. Days Lost			
A. OSHA Recordable Incidence Rate *No. Of Recordables x 200,000* *Hours Worked* B. Lost Time Incident Rate *No. Of Incidents Resulting in Lost Time x 200,000* *Hours Worked* C. Lost Time Severity Rate *Total Days Lost x 200,000* *Hours Worked*			
AVERAGE MONTHLY EMPLOYEES			DAYS LOST
COMMENTS: TOTAL DAYS LOST			
Prepared By Date	PM/Superintendent Date		

OSHA RECORDKEEPING REQUIREMENTS

The following forms are required by OSHA for recordkeeping. The forms and the instructions for completing the forms are in the OSHA booklet entitled "Recordkeeping Requirements under the Occupational Safety and Health Act."

a. OSHA Form 200, Log Summary of Occupational Injuries and Illness; and

b. Employer's Report of Occupational Injury or Illness, CDLSR Form 5020 (Rev. 3); or

c. OSHA Form 101, Supplementary Record of Occupational Injuries and Illness.

Each Contractor shall be responsible for its own records. A copy of these reports shall be made available to the MBTA and to the Risk Management consultant on request.

9.0 ACCIDENT INVESTIGATION, REPORTING AND RECORDKEEPING

9.1 First Aid

All accidents/incidents which result in on-site first aid treatment shall be investigated by the Contractor's Safety Supervisor, and submit a report of accident (Exhibit 8-3) to the MBTA within twenty four (24) hours of the occurrence.

9.2 OSHA Recordable

Accidents and incidents resulting in medical treatment by a licensed physician shall be thoroughly investigated by the Contractor's Safety Supervisor and reports of Accident (Exhibit 8-3) and Workers Compensation Report completed within twenty four (24) hours.

All reports must be submitted to the MBTA. The accident investigation should generate appropriate recommendations for corrective actions to prevent recurrence of similar accidents.

9.2.1 Analysis and Corrective Action

Corrective actions can only be taken when specific factors of an accident/unusual occurrence have been accurately developed and the resulting recommendations have been disseminated to the responsible persons.

In the event of a serious accident, prompt oral reporting of the preliminary details is mandatory. See 9.4 under this section for required telephone reports.

In preparing written reports of an accident/unusual occurrence, statements and comments should be confined to objective finding of facts and determining the root cause. The Contractor's accident/unusual occurrence report, project records, progress, reports, and daily time reports may become important evidential material in any ensuing legal action. Accordingly, for the date on which a potential third party accident has occurred, it is important to be specific and accurate in describing work being performed, crew of equipment being utilized and their exact location.

9.2.2 Recordkeeping

Complete records are necessary accident prevention tools, but in addition, specific records are required by OSHA. Failure to maintain these records is a citable offense. Also, investigations, resultant reports and cumulative records are necessary for the protection of all concerned parties.

9.3 Procedures

9.3.1 Investigations and Reports

a. Exhibits 8-1 through 8-5 contain administrative instruction and report forms to be used by Contractors and Subcontractors for the following required reports
   1. Construction Safety Surveys
   2. Report of Accident of Damage to Equipment or Property (Exhibit 8-2)

3. Supervisors' Report of Accidents/Unusual Occurrences (Exhibit 8-3)

4. Accident Experience Summary Report (Exhibit 8-4)

5. Recordkeeping Requirements under the Occupational Safety and Health Act, Reprint 1985 (Exhibit 8-5)

9.3.2 Photographs

Photographs should be taken in conjunction with investigations of accidents involving serious personal injury, all non-project personnel injuries, substantial property damage (including motor vehicle), equipment or material failure, and all accidents that may, even remotely, involve third party action.

Photographs should be sufficient in number to adequately reflect the general area as well as pertinent details from a variety of angles. It is better to take too many than not enough. Photographs should be taken as soon as possible following the accident. Identify each print on its reverse as follows: name of injured (if equipment damage, type; if property damage, location); date of accident; photographer's initial, and time photographs taken (date if different from occurrence); direction facing, and brief description of photo.

9.4 Telephone Reports

Should a serious accident occur resulting in damage to public or MBTA property; or bodily injury to the public or employees of the MBTA, its Consultants, Contractors, or their Subcontractors, a telephone report shall be made as soon as practicable to the Resident Engineer.

REPORT OF ACCIDENT OR DAMAGE TO EQUIPMENT OR PROPERTY

1. This form shall be prepared covering every accident to equipment or property.

2. The form shall be prepared from information as a result of investigation or direct reports by the person or persons involved or responsible.

3. Reports shall be completed promptly.

4. All accidents involving damage to property, including raw materials or equipment, installed equipment, motor vehicles and heavy construction equipment are reportable.

5. Investigation of alleged damage to private property:

   a. Buildings that may be affected by construction shall have been inspected by outside consultant (selected by the Risk Management Consultant and the MBTA).

   b. If, in the course of construction work, property damage occurs which is allegedly due to construction operations, this reporting procedure is to be followed.

   c. If, however, a property owner reports damage to its property, of which its compliant is the first intimation, and alleges that it is due to construction, he will probably request prompt inspection.

   d. In complying with an owner's request for report of damage allegedly due to construction work, particular care is required to see and record only the facts and to avoid expressing opinion. The owner's opinion shall be recorded as "remarks by owner.

"EXHIBIT 8-3

REPORT OF ACCIDENT OR DAMAGE TO EQUIPMENT OR PROPERTY

CONTRACTOR_____ DATE_____

SUBCONTRACTOR _____ MBTA CONTRACT NO._____

SECTION DESIGNER_____

LOCATION OF ACCIDENT)_____

EQUIPMENT INVOLVED (DESC. & SERIAL NOS.) (OWNER) _____

_____

WERE THERE PERSONAL INJURIES YES_____ NO _____

DAMAGES $_____

WITNESS TO ACCIDENT

_____

_____ WERE THEIR STATEMENT (S) OBTAINED

FROM WITNESS(ES) YES ___ NO ___

_____

_____ ARE STATEMENTS ATTACHED

YES ___ NO ___

REMARKS

_____

_____

TIME OF ACCIDENT ___A.M. ___ P.M. DATE_____

WEATHER CONDITIONS _____ TEMPERATURE _____

ROADWAY OR SURFACE_____ WET____ DRY____ ICY____ OTHER _____

IF OTHER, EXPLAIN_____

IF MORE SPACE IS REQUIRED, USE BACK OF THIS SHEET FOR ADDITIONAL INFORMATION AND SKETCHES

SIGNED_____

TITLE_____

SAMPLE OF
CONTRACTOR RIGHT-OF-WAY SAFETY CERTIFICATION
CARD AND HARD HAT STICKER

Number_____

THIS IS TO CERTIFY THAT

_____

HAS COMPLETED THE ROW CONTRACTOR
SAFETY AWARENESS CERTIFICATION PROGRAM

DATE:_____ INSTRUCTOR:_____

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SAFETY POLICY/PROCEDURE

SUBJECT: CONTRACTOR SAFETY VIOLATION PROGRAM	ORIGINAL ISSUE DATE: July 1, 1996	SAFETY/POLICY PROCEDURE #: 7.3 REV 2

I. POLICY

The Authority is committed to overseeing that all projects are completed in a safe manner, without injury or losses resulting from accidents. The Safety Department is authorized to conduct workplace safety inspections to ensure contractor compliance with all applicable safety rules, regulations, and Authority requirements.

II. PURPOSE

To establish procedures for notification of and conducting safety inspections and the issuance of safety violation assessments by the MBTA Safety Department to Contractors who compromise the safety and health of the workforce and to enforce contractor compliance with applicable safety and health regulations and job safety requirements.

III. SCOPE

These procedures will apply to the Safety Department, Design and Construction Department, and all MBTA Contractors and Subcontractors. Authority-issued safety violation assessments do not relieve the contractor from any responsibility or obligation for fines or penalties levied upon the Contractor by other local, State or Federal agencies.

Definitions and Abbreviations (see MBTA Standard Specifications-Bidding and Contract Requirements and Division 1-General Requirements, dated November, 1983, and the following:)

Accident/Incident: An **accident** is an unplanned and undesirable event resulting in injury and/or loss. An **incident** is an unplanned and undesirable event that nearly results in injury or loss.

Assessment: Assessment is the monetary amount determined by the Safety Department to be paid by the Contractor for the safety violations cited.

Construction Inspector: The Construction inspector is the Authority's field representative who reports to the Resident Engineer, the Authority's representative at the Project site.

Deputy Director of Design & Construction: The Deputy or Assistant Director of Design and Construction, reports to the Director of Design and Construction, and plans, directs and oversees construction activities, methods and procedures relating to the Authority Design and Construction Projects

SUBJECT: CONTRACTOR SAFETY VIOLATION PROGRAM	ORIGINAL ISSUE DATE: July 1, 1996	SAFETY/POLICY PROCEDURE #: 7.3 REV 2

Director of Design and Construction: The Director of Design and Construction oversees and implements all MBTA Design and Construction Projects.

Director of Safety: The Director of safety is charged with overseeing Authority Safety Programs, Policies and Procedures and reports directly to the General Manager's Office.

Engineer: The General Manager of the Authority or designee acting within the scope of the particular duties entrusted to this person.

OSHA: The Occupational Safety and Health Administration under the United States Department of Labor. The OSHA Standards are used as minimum safety guidelines for Authority projects.

Project Manager: The MBTA Project Manager reports to the Deputy or Assistant Director of Design and Construction. The Project Manager has responsibility for the project's design and construction budget, cost and quality control, schedules, claims and safety compliance.

Resident Engineer: The Resident Engineer provides onsite supervision of assigned MBTA Construction Inspectors who are responsible for overseeing the Contractor's compliance with the Authority's contract plans and specifications, including Article 5.15 - Safety and First Aid Requirements, as amended.

Safety Official: The Safety Official is the MBTA's Safety Department representative who has knowledge and experience in the safety field. The Safety Official is trained in OSHA standards and in the recognition of safety and health hazards as well as the Authority's Safety Policies and Procedures. The Safety Official is authorized to issue safety violations and assessments (as approved by the MBTA Safety Director) and co-signed by the MBTA's Project Manager and/or Resident Engineer.

SUBJECT: CONTRACTOR SAFETY VIOLATION PROGRAM	ORIGINAL ISSUE DATE: July 1, 1996	SAFETY/POLICY PROCEDURE #: 7.3 REV 2

IV. PROCEDURES

The representatives of the MBTA Safety Department, upon presenting proper identification are authorized to:

X Enter without delay, with reasonable prior notice to the Authority's Resident Engineer, any construction site, workplace, or other areas where work is being performed for the Authority.

X Inspect and investigate, any such place of employment and all pertinent conditions, structures, machines, apparatus, devices, and to question, in confidence, any project employer, owner, operator, agent or employee.

X Issue the General Contractor the Authority's safety violation(s) notice, if applicable.

Under special circumstances, advanced notice will be given to the Authority's Project representatives. Such notice will not be less than 24 hours. The special circumstances include the following:

X Inspections that take place after regular business hours, or that require special preparation.

X Situations in which the Safety Department determines that advance notice would produce a more thorough or effective inspection.

The MBTA Safety Official conducting the site safety inspection will notify the MBTA Resident Engineer and the General Contractor's Safety Supervisor/Representative of any safety violations found before leaving the job site or within the 24 hour period of the inspection, depending on severity of the hazard.

After the Safety Official reports the finding, the MBTA Safety Director will determine whether assessments will be issued. The assessment amounts will be determined based on the violation. The Safety Official shall issue four copies of the safety violations (see Exhibit 1)

One copy will be issued to the MBTA Resident Engineer to ensure the Contractor's corrective action and safety compliance. The second copy will be issued to the General Contractor's on-site representative. The third copy will be sent by certified mail to the General Contractor's Senior Officer and/or the Contractor's Safety Director. A copy will be retained by the MBTA Safety Department, and the information will be entered into the Safety Department's database for follow-up and record keeping purposes.

A follow-up inspection may be conducted to determine whether previously cited safety violations have been corrected. If the Contractor has failed to abate the safety violation, the Safety Official will inform that Contractor that he/she may face additional daily assessments while such failure continues or the safety violation remains unresolved. The Contractor's Senior Office and/or Safety Director will be notified by certified mail.

V. OSHA Violation Categories and Violation Assessment Table (see Exhibit II):

All violations to be determined by the sue of OSHA Regulations CFR 29 including Part 1926 and Part 1910 as amended. These Regulations will be considered as the safety guidelines, unless other more stringent safety requirements are noted in the Contract.

A. OSHA Violation Categories by Types:

X Other-than-Serious Violation--"A violation that has a direct relationship to job safety and health, but would not cause death or physical harm".

X Serious Violation--"A violation where there is a substantial probability that death or serious harm could result".

X Willful Violation---"A violation that the employer intentionally and knowingly commits. The employer is aware that a hazardous condition exists, knows that the condition violates an (OSHA) standard or other obligation of the OSHA Act, and makes no reasonable effort to eliminate it."

X Repeated Violation--"A violation of any standard, regulation, rule or order where, upon reinspection, a similar violation is found and the original citation (violation notice) has become a final order"

X Failure to Abate--"Failure to correct a prior violation may bring a civil penalty (assessment) for each day that the violation continues".

B. MBTA Assessment Ranges based on OSHA Category:

1. Other-than Serious: ($100.-$900.)

2. Serious Violation: ($1000.-$3000.)

3. Willful Violation: ($3000.-$7500.)

4. Repeated Violation: ($5000.-$9500.)

The **First** violation, shall be a written warning or, depending on the severity of the incident, could include assessment up to $3,000. The safety violation will be corrected immediately or within a time frame as noted on the Notice of Violation.

The **Second Repeat** violation, depending on the severity of the violation, will have assessments of $3,000. Up to $7500. Levied upon the General Contractor. The safety violation will be corrected immediately or within a time frame noted on the Notice of Violation.

The **Third Repeat** violation will result in an additional assessment of $5000.-$9500. Being levied upon the General Contractor and may require a formal review of the on site safety program with the

Contractor's insurer and at the Contractor's expense. That review may also require additional safety training for the General Contractor(s) personnel.

V1. DISPUTE RESOLUTION PROCESS (See Exhibit III)

The General Contractor will be held accountable for all safety violations on the Project, including those of any subcontractors on the same project. Upon receipt, by certified mail, of a violation notice with assessments, the Contractor will have a **15 calendar day period** to dispute the assessment violation which written notification must be forwarded along with the "Contractor Safety Violation Dispute Resolution Form" (Exhibit III), to the MBTA Director of Safety (State Transportation Building, 10 Park Plaza Rm. #8350, Boston, MA 02116), and a copy forwarded to the MBTA Project Office.

The MBTA Dispute Resolution Committee shall consist of the Director of Safety or designee, the Director of Design and Construction or designee, and the MBTA Project Manager. The purpose of the committee will be to determine whether the safety violation assessments will be upheld, reduced or dismissed. The dispute resolution meeting will include the General Contractor's Project Manager/Superintendent, the General Contractor's designated site safety supervisor/representative and/or the General Contractor's Corporate Safety Director.

The assessment values determined for the various safety violations will be withheld from subsequent General Contractor's monthly pay estimate request. The Final Payment for work performed will be reduced by those amounts previously assessed. Assessment funds will be used to further promote and reinforce safety and health on the job through continuous site safety reviews and training.

II. EXHIBITS:

1. Violation Notice Form
2. Violations and Assessment Values
3. Dispute Resolution Form

"EXHIBIT I"

MBTA Safety Department Safety Violation No._____

NOTICE OF SAFETY VIOLATION

Warning First Notice Second Repeat Notice Third Repeat Notice

Project Name:_____ Date:_____

Project Location:_____ Time:_____

Contract Number:_____ Weather Conditions:_____

TO: (Name of General Contractor)_____

ATTENTION OF: (Contractor Safety Supervisor/Representative:_____

General Contractor's Address:_____

THE FOLLOWING VIOLATION(S) OF SAFETY CONDITIONS(S) HAS/HAVE BEEN NOTED AND SHOULD BE CORRECTED:

STOP WORK until the violation is corrected: Immediately By_____

Description of Safety Violation(s):

_____

_____

Notice Issued by MBTA Safety Official:_____

Notice Received By:_____ Employer/Title:_____

MBTA SAFETY VIOLATION ASSESSMENT

FIRST Violation
Date:_____
Amount:_____

SECOND Repeat Violation
Date:_____
Amount:_____

THIRD Repeat Violation
Date:_____
Amount:_____

A COPY OF THIS VIOLATION NOTICE MUST ACCOMPANY THE DISPUTE RESOLUTION FORM

SAFETY VIOLATION ASSESSMENT TABLE

EXHIBIT II

OSHA CATEGORY (CFR 29 PART 1926)	SAFETY VIOLATION OCCURRENCE		
	First	2nd/Repeat	3rd/Repeat
GENERAL SAFETY AND HEALTH PROVISIONS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROLS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
PERSONAL PROTECTIVE & LIFE SAVING EQUIPMENT	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
FIRE PROTECTION AND PREVENTION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
SIGNS, SIGNALS OR BARRICADES	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
MATERIALS HANDLING, STORAGE, USE AND DISPOSAL	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
TOOLS - HAND AND POWER	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
WELDING AND CUTTING	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
ELECTRICAL	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
SCAFFOLDING	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
FLOOR AND WALL OPENINGS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
CRANES, DERRICKS, HOISTS, ELEVATORS AND CONVEYORS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
MOTOR VEHICLES, MECHANIZED EQUIPMENT AND MARINE OPERATIONS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
EXCAVATIONS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
CONCRETE AND MASONRY CONSTRUCTION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
STEEL ERECTION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
UNDERGROUND CONSTRUCTION, CAISSONS, COFFERDAMS, AND COMPRESSED AIR	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
DEMOLITION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
BLASTING AND USE OF EXPLOSIVES	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
POWER TRANSMISSION AND DISTRIBUTION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
ROLLOVER PROTECTIVE STRUCTURES OVERHEAD PROTECTION	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
STAIRWAYS AND LADDERS	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500
TOXIC AND HAZARDOUS SUBSTANCES	Warning Up To $3000	$3000 - $7,500	$5,000 - $9,500

"EXHIBIT III"

CONTRACTOR SAFETY VIOLATION DISPUTE RESOLUTION FORM

1. Contractor _____

2. Description of Violation: _____

_____ Violation No._____ _____

3. MBTA Contract No._____ Date of Violation:_____

4. Contract Description: _____ Date of Notice:_____

_____

_____

5. Amount of Assessment(s): _____

6. Contractor Action Taken:

_____

7. Dispute Issues:_____

_____

_____

****

FOR DISPUTE RESOLUTION COMMITTEE COMMENTS (ONLY)

Committee Findings: _____

_____

_____

Committee Action Taken: _____

_____

_____

_____ _____

Director of Safety/Representative Date

_____ _____

Director of Design and Construction/Representative Date

_____ _____

MBTA Project Manager Date

_____ _____

Contractor Project Manager/Superintendent Date

_____ _____

Contractor Site Safety Supervisor/Representative Date

THIS FORM MUST HAVE THE ABOVE ITEMS 1-7 FILLED IN AND ACCOMPANY THE DISPUTE MEETING REQUEST

END OF SECTION

SECTION 01569

SYSTEM SAFETY CERTIFICATION

1.01 DESCRIPTION

A. This Section specifies requirements to produce a Safety Certification Report which shall certify that at the time of inspection, all Safety Critical Elements of this Contract are safe for passengers, MBTA employees, emergency responders, and the general public. The formal document also ensures that all Safety Critical Elements are in compliance with regulatory codes and agencies.

B. Final acceptance of the Safety Certification Report shall require written approval of the MBTA Chief of Safety.

C. The **System Safety Certification Program Policy**, which applies to operating systems (e.g., fire alarms, operation control centers, vent/fans, signal/power systems, vehicles, and operation plans) and construction projects (i.e., stations, facilities, rails, and bridges). Collection of all certification reports, verification of the safety and acceptance by the MBTA of all Safety Critical Elements, and the Safety Certification Report shall be the responsibility of the Contractor.

1.02 SAFETY CRITICAL ELEMENTS

A. The safety certification work covers operational safety under system safety, operational safety, and occupational safety. The project elements which are safety critical and a list of specification with inspection, report, and training requirements follows. *(This list will be developed by the System Safety Engineer, the Construction Project Manager, and the design consultant).*

Spec. Section	Paragraph No.	Test Description
XXXXX	X.XX.X.X	XXXXXXXX

1.03 PROGRAM TASKS

A. The MBTA System Safety Engineer shall identify all Safety Critical Elements. The Contractor shall compile and document the safety requirements as described under Part IV, A, Task 1 of the attached System Safety Certification Policy.

B. The Contractor shall verify equipment and system elements; verify procedural system elements ; verify personnel training; verify system integration; and perform safety certification for the Safety Critical Elements of this Contract as described under Part IV B through F of the attached System Safety Certification Policy.

1.04 MEASUREMENT AND PAYMENT

A. No separate measurement and payment will be made for work required under this Section. All costs in connection therein shall be considered therewith shall be considered incidental to the item or items of work to which they pertain.

MBTA
SYSTEM SAFETY CERTIFICATION PROGRAM

I. INTRODUCTION

The goal of this Safety Certification Program is to certify that all practical steps have been taken to optimize the operational safety of the MBTA during and after construction, **before** the start of revenue service.

The program will be conducted by the MBTA as a self-certifying agency. The Safety Certification Program is administered by the MBTA Safety Department which reports directly to the General Manager's Office.

The program requires the support of all affected departments. The Safety Department is responsible for coordinating the documentation of all tasks that address safety critical elements. Safety Critical elements are defined as those items assessed as needed to eliminate, minimize, or control hazards, which could result in death, severe injury, or major system or public property damage. Safety certifiable elements exist in system equipment, facilities, procedures, and personnel, both individually, and as an integrated whole. (See Pages 4 & 5 for examples of certifiable elements).

Specific activities of the Certification Process include:

(a) Identification of safety requirements
(b) Verification of compliance with safety requirements
(c) Identification and resolution of non-compliances (open items).

II. PROGRAM OBJECTIVES:

The objective of the Safety Certification Program is to produce a formal document that ensures at the time of operation, a particular system is safe for passengers, employees, emergency responders, and the general public. Safety Certification verifies that the project is in compliance with regulatory codes and agencies. For example, when a train station is modernized, the Safety Certification Program will ensure that the Fire Alarm System meets the applicable state and city codes, and the MBTA will receive an occupancy permit stating the station is acceptable to the fire department. The Safety Certification Program will identify which items require certification and will verify that the contract documents incorporate safety requirements from the design stage. This program will also verify procedures/results and identify open items or work arounds.

The ultimate objective for this program is to provide overall risk reduction by systematically addressing hazards before opening for revenue service. This Safety Certification Program has already proved its importance with the opening of the Blue Line on June 24, 1995, and the New Old Colony Railroad, on September 26, 1997. The Safety Department was able to identify safety critical elements to ensure that they were addressed prior to the start of revenue service.

With this proactive program in place, we can expect positive results: a safer railroad.

III. PROGRAM SCOPE:

The Safety Certification Program covers Operational Safety only, under three different, but overlapping functional areas:

(a) **System Safety** - the application of operating, technical, and management techniques and principals to the safety aspects of a system throughout its life to reduce hazards to the lowest practical level through the most effective use of available recourses.

(b) **Fire/Life Safety** - elimination, minimization, or control of potential hazards to patrons, employees, emergency response personnel, and the general public caused by fire, smoke, explosion, or resulting in panic; and the protection of MBTA property from fire or explosion.

(c) **Occupational Safety** - elimination, minimization, or control of potential hazards to employees and emergency response personnel. (The certification process itself is concerned with the end product, the operational system elements (equipment and facilities, personnel, procedures), and the integration of these elements into one integrated and independent operation).

The following are typical Certifiable Elements:

(a) **Systemwide Elements**

1. Safe Braking
2. Automatic Train Control
3. Communications Equipment
4. Passenger Vehicles/Locomotives
5. Train Clearance
6. Running Rail/Field Welds
7. Signals
8. Grade Crossings
9. Bridges/Structures

(b) **Facility**

1. Passenger Stations
2. Layover Facilities
3. Site Security
4. Central Control
5. Maintenance Facilities

(c) **Procedural Elements**

1. Operations Rules and Procedures
2. Maintenance Rules and Procedures
3. Emergency Response Rules and Procedures
4. Personnel Training and Qualification Procedures

(d) **Personnel Elements**

1. Operations Personnel
2. Maintenance Personnel
3. Emergency Response Personnel

(e) **Integration Elements**

1. Integrated Test Procedures
2. Integrated Test Reports
3. Pre-Revenue Operations Test Procedures, including Emergency Response Scenarios
4. Pre-Revenue Operations Test Reports (e.g., grade crossing tests)

IV. PROGRAM TASKS

The program tasks described in this section comprise the overall certification process. Procedures, methodologies, checklists, work flow charts, schedules and other documentation necessary for the conduct, review and completion of tasks will be prepared under the appropriate task.

A. TASK 1 - IDENTIFICATION AND DOCUMENTATION OF SAFETY REQUIREMENTS

This task will involve the identification, compilation and documentation of safety requirements applicable to the equipment/facility and system elements shown under Section III of this plan.

Source documentation for the identification of safety requirements will include:

1. The technical specification for MBTA contract(s).
2. MBTA design and performance criteria.
3. Safety studies and analyses conducted by MBTA or consultants.
4. Pertinent Safety criteria and studies from other rail transit systems.
5. Applicable codes, standards, and regulations.

All safety requirements extracted from the technical specifications for equipment/facility element contracts and procurements will be documented on Safety Certification documents. Safety requirements extracted from source documentation, other than contract or procurement technical specifications, will be identified for resolution as open-items.

Primary emphasis will be given to identifying those safety elements that are "safety critical". Safety critical elements, as defined earlier, are those items assessed as needed to eliminate, minimize, or control hazards, which under consideration of the potentially worst critical mishap could result in death, severe injury, or major system or public property damage. However, safety codes and standards not falling within the above "safety critical" category will be included in the program so that non-critical safety elements can be verified. Safety Critical elements will be shown in **"Bold Type"** when producing a list of certifiable elements.

B. TASK 2 - VERIFICATION OF EQUIPMENT/FACILITY AND SYSTEM ELEMENTS

This task will be applicable to construction, installation, and procurement contracts appropriate to the equipment/facility element being considered. It will involve the completion of the Safety Certification elements listed in Task 1, to verify that contractors have complied with safety requirements. If non-compliance with a safety requirement is identified, it will be logged as an "open item" and tracked for resolution as described under Task 6.

C. TASK 3 - VERIFICATION OF PROCEDURAL SYSTEM ELEMENTS

Safety review and verification of MBTA operational rules and procedures and personnel training documentation will be conducted to ensure that procedural documents display contributions to

certifiable levels of safety for the operational system. This task will be verified by the Safety Department.

A Safety Certification Procedures Review Log will be prepared and used to document the results. Where non-compliance with established safety requirements are found, or where new requirements are identified during reviews, they will be logged as an "open item" and tracked for resolution. (See Sample - Table 1).

D. TASK 4 - VERIFICATION OF PERSONNEL TRAINING AND QUALIFICATIONS

Verification of personnel training and qualification for operations, maintenance, and emergency response personnel will be conducted by review of personnel certification documentation provided and approved by the Operations Manager and the Chief Engineer. Verification under this task will be conditional, pending final verification under Task 5 - System Integration.

E. TASK 5 - VERIFICATION OF SYSTEM INTEGRATION

1. This task will consist of safety review and verification of:

   (1) Integrated Test Procedures
   (2) Integrated Test Reports
   (3) Pre-Revenue Operations Test Procedures, including Emergency Response Scenarios
   (4) Pre-Revenue Test Reports

2. Integrated Tests are conducted to verify the physical and/or the functional operations of equipment/facility elements that are integrated with other equipment/facility elements, subsequent to or as part of Acceptance Tests for individual equipment/facility elements. For example, when testing an elevator in a station, you must also test the emergency call system inside the elevator and at the platform at lobby levels. Integrated Test Procedures identified as required to verify the safety of operations, or the integrity of emergency response communications will be reviewed to:

   (1) Verify the incorporation of safety requirements, and

   (2) Verify that the procedural content, including test pre-requisites, is sufficiently consistent with the stated purpose(s) or objective(s) of the test.

   Safety requirements will be extracted from pertinent source documentation listed in Task 1. Integrated Test Reports and any separate quality surveillance reports will be reviewed to verify that the safety requirements and parameters established by the approved test procedure have been met, and that any test non-compliances have been resolved.

3. Pre-Revenue Operations Tests are conducted subsequent to the completion of integrated tests, to verify the operational readiness of conditionally qualified operational personnel, emergency response personnel, and/or procedures, through simulated revenue service. Normal and abnormal operations are conducted, including emergency response scenarios. Pre-revenue operation test procedures will be reviewed to verify that the stated purpose(s) of the simulated revenue service, and the overall procedural content, are of sufficient scope and depth to display the overall operational safety status. Along with others, Safety personnel will monitor and report on the conduct of pre-revenue operations tests to:

a. Assess the effectiveness and the need for additions to, or revisions of, operational rules and procedures, or retraining of personnel.
b. Assess the effectiveness of emergency response scenarios and response activities.

Pre-revenue operations test reports, safety assessment reports and any other reports will be reviewed to verify that a certifiable level of operational safety has been demonstrated during the conduct of pre-revenue operations. Where such reports display deficiencies in operational rules or procedures, or in compliance with rules and procedures, or in the effectiveness of the conduct of emergency response procedures, each deficiency will be logged as an "open item" and tracked for resolution as described under Section IV, Task 6.

4. Pre-revenue operations tests must be completed at least 2 weeks prior to opening revenue service.

F. TASK 6 - SAFETY CERTIFICATION

This task will be conducted to verify and display, by documentation, that a certifiable level of operational safety has been achieved for the MBTA System, and will include:

1. Preparation of a chronological summary report to display and discuss the safety certification activities that have been conducted.

2. Preparation of a comprehensive list of certification documentation.

3. Preparation of an Open Item Status Report, to display the status of all open items identified during the conduct of the certification program. This report will be based on open items documented on Form SC-2. Form SC-2 will be generated by the System Safety Engineer or designee as needed.

Open items will be resolved by:

1. Corrective Action

   (1) Contract Change Order or Contract Procurement.
   (2) Resolution

   (1) Temporary Resolution - deferral or corrective action with or without a work around.

   (2) Final Resolution.

All open items will be entered on a Safety Certification Open Item Status Log which will be used to track, report on and document the resolution of each item until closed out (see sample Table 1).

4. A Safety Certification Report will be submitted to the General Manager. This report will be prepared by the Safety Department showing all initial finding(s), conclusion(s), and recommendation(s).

5. The sample Safety Certification Sheet on the next page illustrates the type of elements to be certified along with who is responsible, when a test was performed and what outstanding issues remain.

6. Safety Certification shall be complete prior to revenue service.

INTERIM SAFETY CERTIFICATION OPEN ITEM STATUS LOG
TABLE 1

ITEM NO.	ELEMENT	RESPONSIBILITY	STATUS	COMMENTS
001	Track Geometry		Closed 9/24/97	letter 9/24/97
002	Track Geometry (curve analysis)		Closed 9/24/97	letter 9/
003	Operator Training		Closed 9/18/97	trak (engineetrs a spares) qualified for interim service)
004	Equipment Certifications		Cl 9/19/97	Lett G. Mo on Locomotives 9/24/97.
005	Bridge Acceptance (Main Line)		losed 9/24/97	lette /23/9
006	Clearance Testing		losed /97	lette /23/9 eed test data for files
007	R-O-W Signage (Main Line)		losed 19/97	lette /23/9
008	Radio Testing		losed /97	Lette RO 9 9/97
009	Rule Revisions		losed 9/19/97	Lette Amtra 9/19/97
010	R-O-W Fencing (Main Line)		losed 9/	lette /23/9
011	OCRR Emergency Response Plan		losed 23/97	Plan eive om Amtrak 9/23/97
012	CETC Training		losed 19/97	Amt /19/97
013	Billings Rd. Ped. Overpas		losed 19/97	Const ction letter 9/19/97
014	Braintree Noise W		N	Not safety critical
015	MHD Notification		losed 18/97	Construction letter 9/8/97
016	Station Parking lot Plat m L ting		ed 9/25/97	letter 9/23/97
017	Stairs/Railings		Closed 9/24/97	letter 9/23/97 (Work around procedure)
018	Platform Clearanc		Closed 9/24/97	letter 9/23/97 H. Haywood to get test data from Amtrak
019	Pedestrian Station ings		Closed 9/10/97	Work around (bag and sign)
020	Inner Track Fence		N/A	Not in contract
021	R-O-W Signage Pl Mid.		Closed 9/24/97	letter 9/23/97
022	Sperry Rail Test		Closed 9/22/97	letter 9/23/97 need weld repair data
023	Proficiency Traini		Closed 9/18/97	Amtrak (engineers and spares qualified for interim service)
024	Layover Lighting-Kingston/Mid		Closed 9/24/97	letter 9/23/97
025	Layover Fire Protection System		N/A	Using trailers for interim service
026	State Permits (Layovers)		Closed 9/22/97	EPA permits on file at Safety
027	Public Grade Crossings		Closed 9/18/97	H. Haywood issued verification letter 9/24/97
028	Public Grade Crossings		Closed 9/25/97	Verification letter from A. Barry RRO received 9/25/97
029	Private Grade Crossings		Closed 9/19/97	Letters on file for each location
030	Operation Procedure for dark terr.		Closed 9/19/97	RRO form "D" NORAC rules
031	Main Line Signal Testing		Closed 9/24/97	issued verification letter 9/24/97
032	Main Line Signal Testing		Closed 9/24/97	Verification letter from A. Barry RRO received 9/25/97
033	Automatic Door Procedure		Closed 9/19/97	RRO instructions 9/19/97
034	Bridge Acceptance (Ply/Mid)		Closed 9/24/97	letter 9/23/97
035	R-O-W Fencing (Ply/Mid.)		Closed 9/24/97	letter 9/23/97

DRAFT

V. PROGRAM CONDUCT, COORDINATION AND CONTROL

The Safety Certification Program will be conducted, coordinated, and controlled as an element of the overall operational readiness activity, which has been established to ensure the completion of all required MBTA contracts and tasks prior to revenue service.

a. ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

Safety Certification Organizational Structure and Program Responsibilities are as follows:

1. The Safety Department, through its system safety engineering function, is accountable to the General Manager for the overall function, direction, coordination and control of the conduct of Safety Certification Tasks, and functional approval of certification documentation.

2. The Construction Project Manager and Operations Chief Engineer will function as the information exchange coordination point between the conduct of certification tasks and the conduct of other tasks necessary for operational readiness-status, interfaces, and any relative adverse schedule or functional impacts between certification tasks and other project tasks.

3. Safety, Construction, Railroad Operations and the Project Design Consultant will participate in the completion of safety certifiable elements list.

b. DOCUMENTATION CONTROL

All documentation used and produced during the conduct of the Safety Certification Program will be maintained by the Safety Department.

c. PERIODIC REPORTS AND REVIEWS

Two types of reports will be prepared by the Safety Department throughout the Safety Certification process.

1. Open Item Status Reports will be documented periodically, and will provide the following:

   a. Information on the progress and status of all task activities.
   b. Information on the number and descriptions of open items, and related resolution actions.
   c. Information on known or foreseeable issues that may constrain timely completion of program tasks.
   d. Task assignment and follow-up

2. A Final Summary Report will be prepared and documented after the completion of all safety certifiable items, and will provide:

   a . A summary of task activities.
   b. Task findings and conclusions.
   c. Identification of Open Items identified during a task, and related resolution actions

FORM SC-2

SAFETY CERTIFICATION
OPEN ITEM STATUS LOG

Item No._____ **System Element**_____

Source:_____

Open Item:_____

_____

Assigned Responsibility: _____

Resolve by (Date or Event):_____

Status Date:_____

Resolution Action:_____

By:_____

Resolution Documentation:_____

Approved:_____ **Date:**_____

Resolution Action:_____

By:_____

Resolution Documentation:_____

Approved:_____ **Date:**_____

SAFETY CERTIFICATION

FORM SC-3

MBTA

SAFETY CERTIFICATION
OPEN ITEM STATUS LOG
INSTRUCTIONS

Item No._____**System Element**_____
(Assigned by Safety) **(Assigned by Safety)**

Source:_____
(Of Open Item)

Open Item:_____
(Description of Open Item-State as a Safety Requirement)

_____

Assigned Responsibility:_____
(Pertinent Engineer or Manager)

Date:_____**By:**_____ **(Assigned)(Director of Safety)**

Status Date:_____**Resolution Action:**_____

1. Date Assigned:_____

1. Recommended Resolution by Safety:_____

2. Describe resolution action being taken or to be taken:_____

By:_____**Enter legible signature:**_____

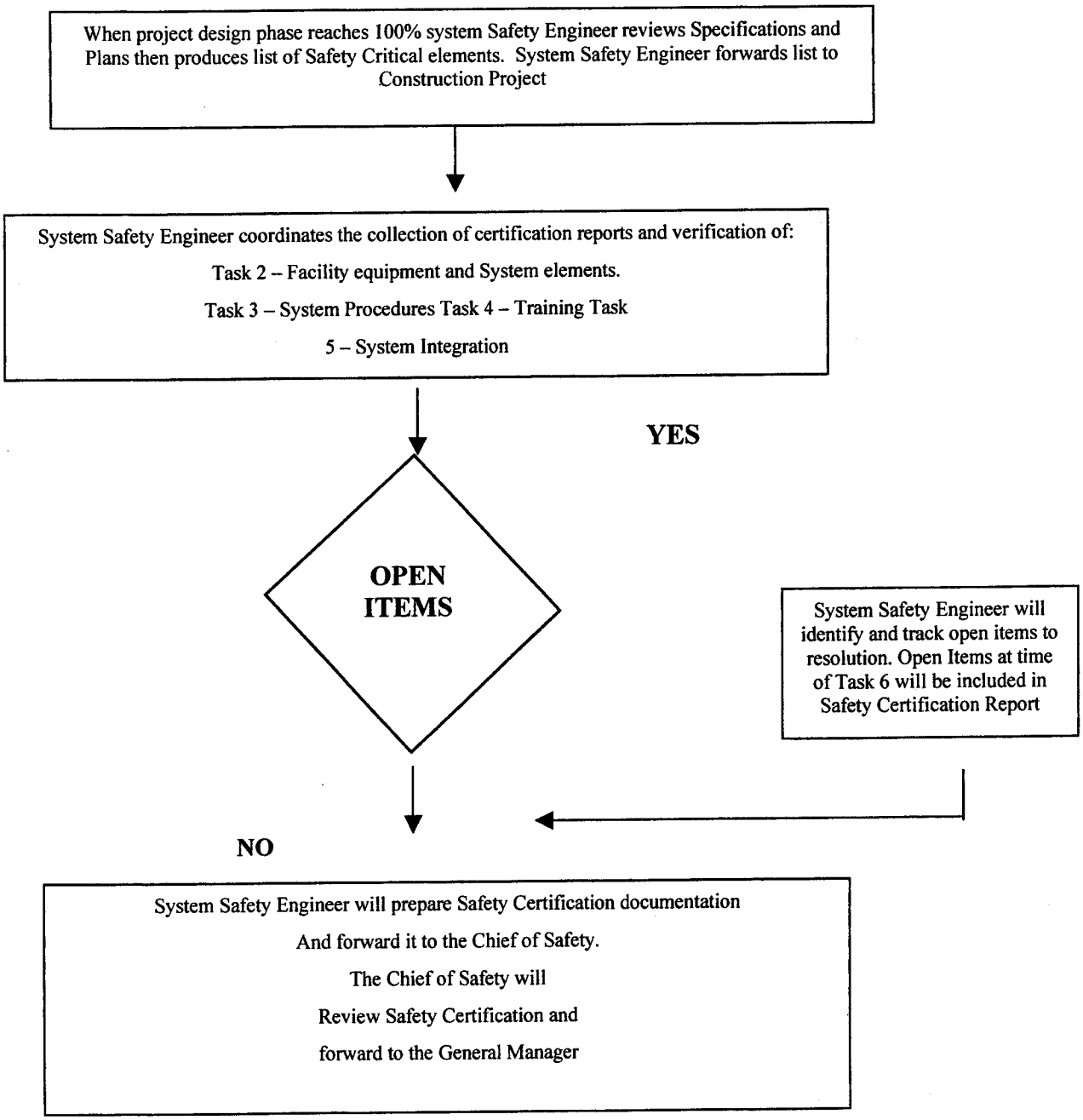
1. (System Safety Engineer)

Resolution Documentation:_____
Identify documentation that displays the resolution, i.e., drawing revision, new or revised procedure, etc.

Approved:_____**Date:**_____ **(Chief of Safety)**

FORM SC-4

SAFETY CERTIFICATION TASK FLOW CHART


When project design phase reaches 100% system Safety Engineer reviews Specifications and Plans then produces list of Safety Critical elements. System Safety Engineer forwards list to Construction Project
System Safety Engineer coordinates the collection of certification reports and verification of:
Task 2 – Facility equipment and System elements.
Task 3 – System Procedures Task 4 – Training Task
5 – System Integration
YES
OPEN ITEMS
System Safety Engineer will identify and track open items to resolution. Open Items at time of Task 6 will be included in Safety Certification Report
NO
System Safety Engineer will prepare Safety Certification documentation
And forward it to the Chief of Safety.
The Chief of Safety will
Review Safety Certification and
forward to the General Manager

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

1.01 GENERAL

A. This Section specifies the general requirements for traffic regulation and load restrictions in accordance with Standard Specifications Division I - General Requirements Section 01570, except as modified herein.

B. Temporary traffic restrictions shall be imposed on the roadways adjacent to the site as required to facilitate the Work and protect the public. The Contractor shall develop a traffic management plan and schedule, and shall review the proposed traffic management plan and schedule with the Transportation Department of the City of Boston, Massachusetts (BTD) and secure their approval of the traffic management plan and schedule to be used before proceeding with the Work.

C. The Contractor shall follow the procedures of the City of Boston Construction Management Program for this project. The Contractor shall develop plans showing traffic maintenance for each stage of construction and construction vehicle routes. After review and approval by the appropriate City departments, the traffic management plan and schedule will become part of the Contract Documents.

D. The Contractor shall coordinate with and secure the approval of the Massachusetts Highway Department regarding the traffic management plan and schedule.

E. Submit the traffic management plan and schedule to the Engineer in accordance with Section 01300.

F. Contractor shall submit all temporary signal locations to BTD for approval.

1.02 MAINTENANCE OF DETOURS

A. Where authorization of direction is given by the Engineer for detouring of general traffic from a traveled way over city streets, implement detours and lane closures in accordance with the traffic management plan and schedule.

1. Remove existing striping by grinding, sandblasting, black paint or tape. Restripe lanes and crosswalks as indicated in the traffic management plan. Where curbing, sidewalks and island are removed or constructed, work shall comply with the details on the Drawings and these specifications. Furnish and install barricades, warning signs, traffic regulation signs, barrier fences and other protective devices as specified. Pavement marking removal for existing and temporary pavement markings will be measured and paid for under Section 02577.

2. When a detour is to be discontinued, restore streets and sidewalks to their original condition or proceed to the next stage as indicated in the traffic management plan. Remove interim and temporary striping, curbing, walkways, signage and protective devices. Restripe lanes and crosswalks. Install traffic signage and other construction in accordance with the traffic management plan.

3. For detours or lane closure of 12 hours or less, interim striping will not be required.

4. Interim striping shall include, but not be limited to, painted markings or taped markings. Interim striping is specified in Section 02577, and will be measured and paid for under Section 02577.

5. Provide barricades, warning signs and other protective devices as specified.

6. For lane closure and detour for off-hour work that is not specifically detailed on the traffic management plan, provide the following as a minimum:

   a. Advance warning signs indicating ROAD WORK AHEAD and DETOUR AHEAD.

   b. Reflective barriers, barrels with flashers and signs to direct traffic through the detour.

   c. Traffic officers to direct traffic.

   d. Flashing arrows to indicate lane closures.

   e. Other traffic control devices as required by the BTD.

   f. Taper lengths calculated using formulas in the Manual of Uniform Traffic Control Devices (MUTCD).

C. The Contractor shall conduct his operation with proper regard for the convenience of the public and in a manner that will minimize congestion and delay to pedestrian and vehicular traffic in the area.

E. Provide notification to the Authority and the bus companies at least 30 days prior to any planned work which would affect routes of bus services which currently use project routes. Notify the Massachusetts Commission for the Blind at least 30 days prior to any changes in path of travel for pedestrians.

F. Provide the minimum travel lanes as indicated on the Drawings. Limited lane closure will be permitted for the specific purposes and durations indicated in the traffic management plan.

1.04 BARRICADES, WARNING SIGNS AND OTHER PROTECTIVE DEVICES

A. Highways and city ways wholly or partly closed to traffic shall be protected by suitable barricades, barrier fences, traffic signs and other traffic devices, furnished and erected at locations shown in the traffic management plan as required by the BTD and as directed by the Engineer. No separate individual compensation will be allowed for these items.

B. Provide and erect all barriers, barrier fences, reflectorized barrels with flashers, flashing arrows, signage and other protective devices to protect the Work from traffic and pedestrians and to direct pedestrians and traffic around partial street and sidewalk closures. Provide sufficient interim lighting such as interim street lights, warning flashers, and illuminated traffic signs to afford adequate protection to the traveling public. No additional compensation will be allowed for these items.

C. All barriers, barrier fences, traffic signs, and other traffic devices shall conform to the MUTCD, the standards of the BTD and the following:

1. Barriers shall be precast concrete, double faced and moveable, in accordance with the Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highways and Bridges, and the Construction and Traffic Standard Details.

2. Barrier fence (Type 1) used in the city streets shall be 6 foot high chain link fence in 10 foot sections, with end posts on each section. The posts shall be core-drilled into the pavement, but not grouted so as to allow for easy removal if directed by the Engineer. The fabric shall be no tighter than a 3 inch mesh.

3. Barrier fence (Type 2) separating the construction site from public sidewalks and walkways shall be 8 foot high chain link fence, as specified in Section 02444.

4. On city streets interim traffic signage, such as warning and regulatory signs, shall conform to the Standards of the BTD. Where warning signs are not included in the BTD inventory, the signs shall conform to the MUTCD or as detailed on the Drawings.

K. The Contractor shall arrange with the BTD for the towing of vehicles within the operations area whose owners cannot be notified to remove them. Signs for the work area shall be furnished by the Contractor and utilized by the Contractor during the active phases of the Contract. The use of signs indicating NO PARKING and TOW ZONE shall at all times be accomplished with the full knowledge and consent of the BTD and the Engineer, and shall conform to the BTD requirements for temporary signs. In some work areas, such signs may have to be removed or covered during certain parts of the day.

L. At the completion of the Contract, all signs shall be returned to the BTD.

M. The Contractor shall supply and maintain all necessary signs and barricades for partial road closures and to keep existing facilities operational.

1.05 TRAFFIC OFFICERS' SERVICE

B. The Contractor shall provide such MBTA, State or Local police officers as are required by the local authorities for the direction or control of traffic within and adjacent to the limits of the work.

E. Allowance for Traffic Officers' Service

1. An allowance will be made to reimburse the Contractor for special duty police required. The allowance will be adjusted to the actual amount paid for such services. Approval of Engineer shall be obtained before arranging for Special Duty Police Officers' service. Under no circumstances will police detail be paid from the allowance for the work efforts for corrective actions to work previously performed or for detail arranged purely for the convenience of the Contractor.

2. All requests for police details shall be referred to the Engineer who will notify the MBTA Police Detail Officer (617-222-1270); in no event shall the request be submitted less than 24 hours in advance of the date and time the detail is required. The MBTA Police Detail Officer will arrange with the appropriate agency to furnish a sufficient number of details. It is the policy of the Authority on property of the Authority to use services of the MBTA Police for details when they are required.

3. The Contractor shall bill the Authority monthly for the services of all uniformed police provided by the City based on receipted invoices and signed receipts provided to the Authority by the Contractor. This invoice shall confirm a monthly statement forwarded to the City covering the hours of service provided by the police officers. The Contractor shall furnish copies of receipted paid invoices without mark-up to the Authority who will reimburse the Contractor.

4. Payment to special duty police officers shall be based on the policy of the agency providing the special duty police officers.

5. The Contractor shall comply with all applicable state and federal laws.

6. With respect to orders, control, and direction, municipal police shall be under the jurisdiction of the Commissioner of Police of the City of Boston.

1.06 INTERIM PEDESTRIAN TRAFFIC FACILITIES

A. The Contractor shall pay particular attention to safety procedures wherever the work area adjoins pedestrian or public traffic areas. To facilitate a safe separation of public traffic and construction operations, the Contractor shall provide and maintain interim sidewalks, fencing, signage and enclosures as shown in the traffic management plan, as required and as directed by the Engineer. The Contractor is responsible for maintaining access to all businesses, residents and abutters at all times. The Contractor shall insure that these facilities are installed in such a manner to provide pedestrians with continuous, unimpeded access to public walkways. As work progresses, the Contractor shall relocate the construction fencing, signage, enclosures, and walkways as required and as directed by the Engineer. The Contractor shall maintain the construction fencing, enclosures and walkways in good condition for as long as they are required at the site and shall remove them from the site at the end of the project as directed by the Engineer. Construction fencing is specified in Section 02444 and will be measure and paid for under Section 02444. Comply with all applicable requirements of ANSI A10.6 and A10-21, for pedestrian and/or public protection.

B. Interim walkways shall be paved with bituminous concrete or Portland cement concrete as specified in these specifications.

1. Interim walkways shall meet all criteria contained in the accessibility regulations of the Americans with Disabilities Act (ADA) and the Massachusetts Architectural Access Board. Particular concern shall be given to maximum longitudinal and cross slopes, use of non-slip surfaces, maximum vertical differential or lips, and design of ramps.

2. Interim walkways shall have the minimum width and headroom as indicated on detail drawings submitted as part of the traffic management plan, and shall conform to the accessibility regulations of ADA and the Massachusetts Architectural Access Board.

3. Provide the minimum lighting level specified for all interim walkways. The Contractor shall furnish and install the interim lighting, and shall furnish power for interim lighting. The cost of power for interim lighting shall be at the Contractor's expense.

   a. Minimum lighting level within Authority property: 20 foot candles

   b. Minimum lighting level on City sidewalks and other public walkways: 5 foot candles

   c. Average to minimum uniformity: 4:1 maximum.

4. Submit detail drawings, as part of the traffic management plan, indicating the design of all interim walkways. The detail drawings shall indicate surface materials, walkways width, headroom, lighting levels, cross slopes, longitudinal slope, ramps handrails and signage. The detail drawings shall also indicate the specific duration that the interim walkways will be in place.

C. Interim Signage

1. Furnish and install signage as indicated on the Drawings and as directed by the Engineer.

2. Interim signage shall serve the following purposes:

   a. Guide motorists and pedestrians through any temporary route deviating from the normal pre-construction, course of travel and changing conditions.

b. Warning motorists and pedestrians at areas where there is potential of a safety hazards including, but not limited to, pedestrian crossings and truck entries.

3. During the course of this Contract frequent revisions to signage will be required to properly direct the public.

4. Interim signage shall include:

a. Identification bands, directional and warning signage, maps and other graphics on painted exterior grade plywood or aluminum sign panels.

b. Interim revisions shall be made by the use of adhesive opaque decals or painted plywood panels.

5. Materials for interim signage shall be as specified in this Section and Section 02457.

a. Aluminum sign panels shall conform to Section 02457.

b. Painted wood panel signs shall be fabricated from exterior grade plywood.

6. Interim signage shall conform to Authority standards and the MUTCD for text style, lettering height, colors and message content.

7. The Drawings indicate some of the interim signage. These are subject to revision by the Engineer. It is currently anticipated that additional interim signage will be required. The exact content of the interim signage will be determined by the Engineer.

D. Interim pedestrian traffic facilities will be measured and paid as specified.

E. The Contractor shall retain the services of a professional engineer registered in the Commonwealth of Massachusetts as required by State and City regulatory authorities for the design of interim facilities including, but not limited to, bracing, shoring, protective shields and interim walkways. Submit stamped and signed calculations and detail drawings to the Engineer for review and comment prior to starting such construction. Submit calculations and detail drawings in accordance with Section 01300.

1.07 MEASUREMENT AND PAYMENT

A. Measurement

1. Measurement for Item No. 0130.200 VEHICULAR AND PEDESTRIAN TRAFFIC MAINT. AND CONTROL will be made on a lump sum basis, furnished, installed and maintained, complete in place and will include the following: temporary signals, traffic cones, high level warning devices, delineators, floodlights, Type I and II barricades, hand signal devices, lanterns and pilot cars. This item will also include maintaining access to all businesses, residents and abutters at all time.

2. An allowance sum as specified in Section 01020 shall be included in the bid for TRAFFIC OFFICERS SERVICES. See Item No. 0130.430 in the bid form. The Contractor shall submit four copies of receipted bills for the above charges to the Engineer for review and approval. The Contractor's overhead and profit will not be reimbursed. If the Contract is not completed within the specified time limit for completion of the Contract (or authorized extended time) no payment will be made for any costs incurred beyond the time of completion.

3. Temporary Precast Concrete Barrier and Temporary Precast Concrete Barrier - Remove and Reset will be measured by the linear foot.

4. Each Type III Portable Breakaway Barricade will be measured as one unit.

5. Special Lighting Units will be measured in days for each unit.

6. Reflectorized Drums will be measured in days for each drum. Flashers and lights mounted on drums shall be considered incidental to this item.

7. All temporary construction, warning, traffic and pedestrian signs will be measured by the square foot. Supports for these signs shall be considered incidental to this item. Regardless of the number of times that a sign may be reused on the project, it will not be measured for payment more than once.

8. Interim Pavement Markings will be measured and paid for as specified in Section 02577.

9. Removal of pavement markings will be measured and paid for in Section 02577.

10. Construction Fence around the construction site will be paid for as specified in Section 02444.

B. Payment

1. VEHICULAR AND PEDESTRIAN TRAFFIC MAINT. AND CONTROL will be made on a lump sum basis.

2. TRAFFIC OFFICERS SERVICES will be paid for under an allowance.

3. Temporary Precast Concrete Barrier, Remove and Reset, shall be incidental to pay item 0222.000, Excavate and Backfill, when relocated at the beginning and end of each night for underpinning operations. See Section 02150, Article 4.01A.

4. All other items in this section will be paid for at the unit lump sum and allowance prices for the quantities determined as specified above.

C. Payment Items

Item No.	Description	Unit
0130.200	VEHICULAR AND PEDESTRIAN TRAFFIC MAINT. AND CONTROL	LS
0130.430	TRAFFIC OFFICERS SERVICES	AL
0340.141	TEMPORARY PRECAST CONCRETE BARRIER FOR TRAFFIC CONTROL	LF
0340.142	TEMPORARY PRECAST CONCRETE BARRIER FOR TRAFFIC CONTROL - REMOVE AND RESET	LF
1041.272	PORTABLE BREAKAWAY BARRICADE - TYPE III	EA
1042.056	SPECIAL LIGHTING UNIT (FLASHING ARROW)	DY

1042.058	REFLECT. DRUM WITH FLASHER (TYPE A)	DD
1042.059	REFLECTORIZED DRUM WITH LIGHT (TYPE C)	DD
1042.240	SAFETY SIGNAGE FOR CONSTRUCTION OPERATIONS	SF

END OF SECTION

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

1.01 DESCRIPTION

A. This Section specifies Project Identification and Signs in accordance with Standard Specifications Division 1 - General Requirements Section 01580, except as modified herein.

1.02 PROJECT SIGN(S)

B. Where and as approved by the Authority, the contractor shall erect and maintain a sign identifying the Project and indicating State participation.

1. One (1) sign of each type shall be erected at the project site where and as directed by the Engineer for maximum public identification of the work and shall be maintained in good condition until completion of the project. Upon completion, the signs shall be removed.

2. Signs are to be cut from standard 4' by 8' waterproof plywood sheets, or other suitable material, and shall meet the design standards as shown in the attached figures (Sign Type A - State).

3. The size may be varied to meet special or local requirements, but proportions shall be maintained.

4. Information and color of 6" horizontal color band to be included in Sign Type A shall be supplied to the Contractor by the Engineer.

5. No information shall be included on the project signs, except that stipulated in the above paragraphs.

E. Display Panel

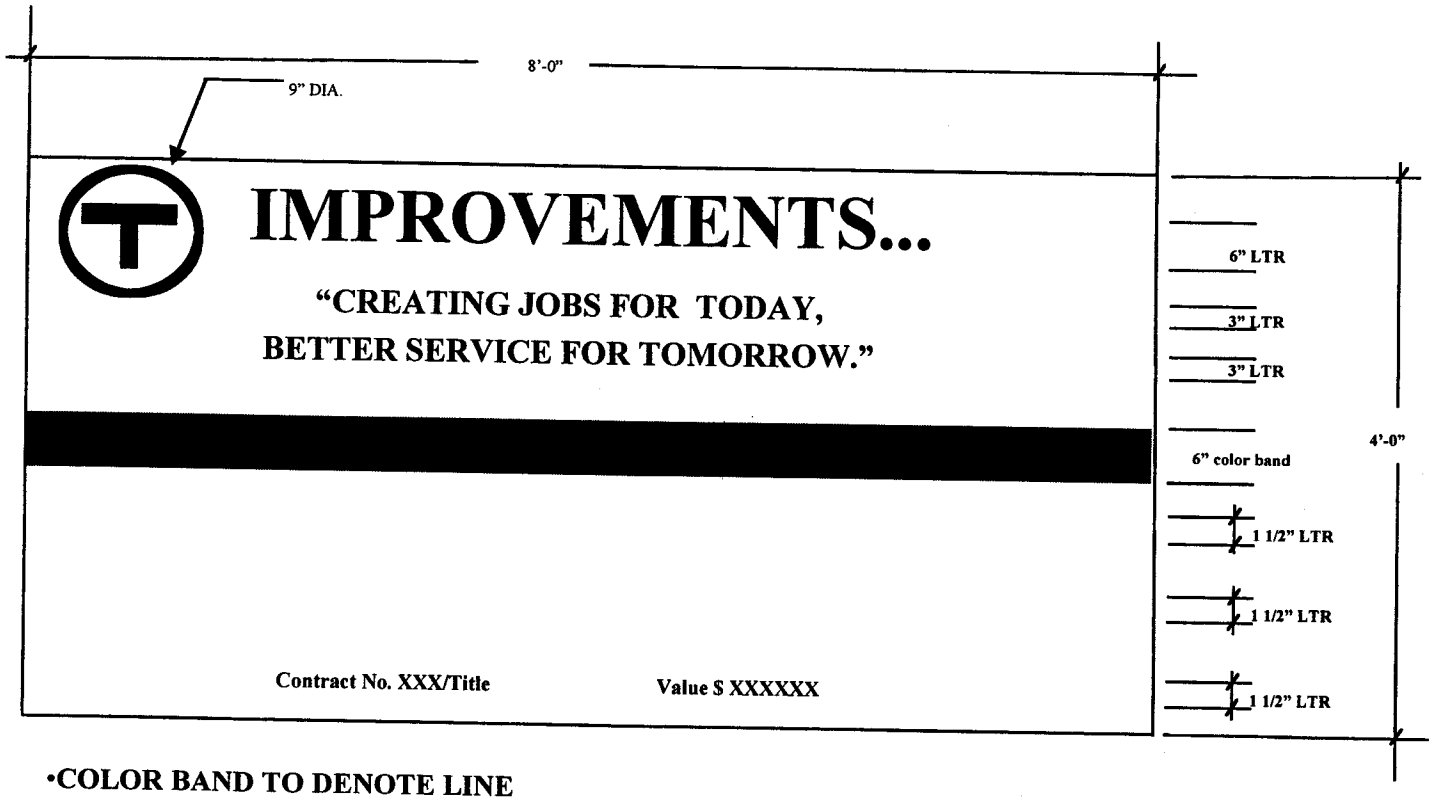
1. Construction, dimensions, colors and lettering shall be as per MBTA Standards.

2. Verbage: The Authority shall furnish the text, photograph and other graphics, and the Contractor shall furnish design and layout, and printing which are all subject to the approval of the Engineer prior to installation in the display panel. Installation of final, approved product in the display panels shall be made by the Contractor.

3. Quantity: One single sided, dual compartment display panel shall be installed on the job site as directed by the Engineer.

1.03 MEASUREMENT AND PAYMENT

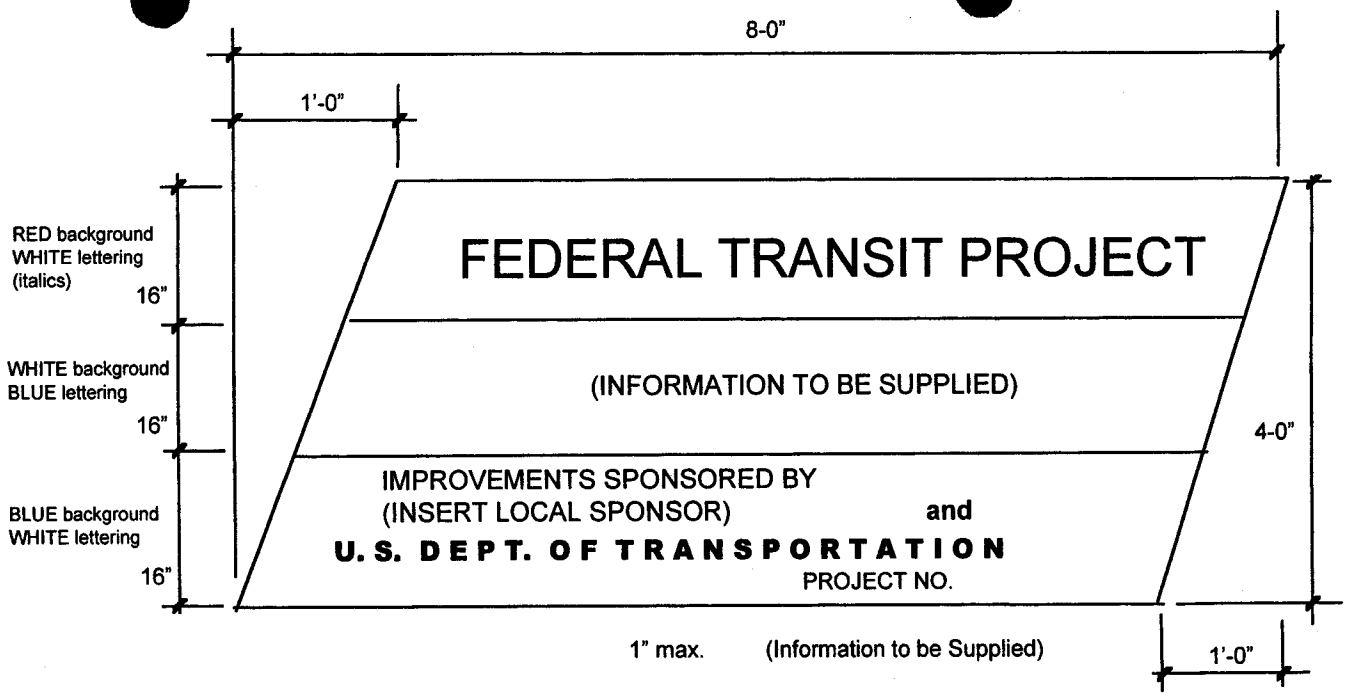
A. No separate measurement nor payment will be made for work required under this Section. All costs in connection therewith shall be considered incidental to the item or items of work to which they pertain.



- **COLOR BAND TO DENOTE LINE**
- **TEXT TO BE HELVETICA MEDIUM**
- **CONTRACT NO. & VALUE TO REFLECT APPLICABLE CONTRACT**

SIGN TYPE A

END OF SECTION



Lettering: Futura Bold Italic (top)
Futura Bold (center)
Futura Demi Bold (bottom)

Adopted July 1966

SIGN TYPE B

SECTION 01590

FIELD OFFICES AND SHEDS

1.01 DESCRIPTION

A. This Section specifies the general requirements for field offices and sheds in accordance with Standard Specifications Division 1 - General Requirements Section 01590, except as modified herein.

B. The work under this section includes all labor, equipment, materials, and services to furnish, install and maintain an Engineer's field office in a location approved by the Project Manager in the immediate location of the project.

C. The work includes but is not necessarily limited to:

1. An office space within an existing building owned or rented by the Contractor containing the required floor space and facilities, approved by the MBTA Project Manager.
2. Sanitary facilities.
3. Heating facilities.
4. Lighting facilities.
5. Telephone and electric services.
6. Office furniture and equipment.
7. Maintenance of field offices.
8. Inspection devices.

D. Submittals

1. Office layout and details, equipment list.

1.02 FIELD OFFICE

A. Provide one (1) office space, within an existing building located in or within 500 feet of Maverick Square, in a location and space to be accepted by the MBTA Project Manager. The office shall be fully equipped and ready for occupancy by the Authority 30 days prior to the commencement of any construction work on the project.

B. Title to the field office and equipment shall remain in the name of the Contractor.

1. The Engineer's field office shall not be used for the Contractor.

C. Protect the field office and its contents on a 24 hours, 7 days a week, 52 weeks a year basis.

1. Security shall also be provided for the field office for the period of time specified after Final Acceptance of the work.

D. The Contractor shall be responsible for the loss of property of the Authority personnel stored in the field office due to fire, theft, storm, flood or other cause.

E. The field office shall be approximately 800 square feet of floor space, excluding toilet facilities, and shall include the following provisions unless otherwise noted:

1. Partitions for office, toilet area, conference room, etc., as follows:

   a. Three offices (120 sq. ft.), one conference room (200 sq. ft.), men's and woman's toilet facilities, and kitchenette facilities.

2. Overhead cabinets and bookshelves

3. 8'-0" coat closet

4. All windows shall be operative or heat/AC with fresh air circulation.

5. Shades or venetian blinds for windows

6. Air conditioning and electric heating equipment capable of maintaining a temperature of 70EF.

7. Two-tube florescent lighting fixtures as required to provide illumination of 70-foot candles in all areas, controlled by surface mounted toggle switches located near the entrance for each room of the Office as directed by the Engineer.

8. Double convenience receptacles located throughout the office space.

9. Sanitary facilities, including supplying toilet tissue, paper towels and soap.

F. Arrange for and comply with all necessary local permits and inspections including and incidental costs.

G. Arrange for water service, electrical service and power, telephone service, and sewer service throughout the duration of the Contract for the field office. Provide the necessary meter connections, fuse box, switch, and other materials/equipment as required by the utility companies, and local agencies.

H. All electrical and plumbing work shall conform with state and local codes

I. Insulate all services where necessary.

J. Provide three (3) parking spaces within a three minute walking radius of the field office. Provide three (3) parking spaces within a three minute walking radius of the Station for Operations personnel.

K. Provide courier service for shop drawing transport from MBTA Field Office to Consulting engineer and back to MBTA Field Office.

L. Provide three (3) Massachusetts Turnpike "Fastlane" transponders for the life of the contract. The Transponders shall be in the name of the General Contractor, monthly fees shall be paid for by the General Contractor and shall be used by the MBTA Project Manager, MBTA Resident Engineer and one designated for MBTA pool vehicles.

1.04 FIELD OFFICE EQUIPMENT

A. Equipment for Engineer's field office shall remain property of the Contractor upon completion of the work. Equipment shall be new, not used, unless otherwise noted. Equipment to be provided shall include the following:

1. Suitable non-freezing type fire extinguisher shall be furnished for each space.

2. 5 office type desks, minimum top dimensions 32 in. x 60 in., with two or more drawers on each side. Desks shall include halogen desk task lamps. (desks may be reconditioned)

3. 5 new swivel task/ergonomic high back, w/ arms, fabric chairs with five (5) casters and adjustable height tilt seat.

4. One slant-top drafting table, 48 in. x 89 in. minimum size with cover and storage compartment, and a parallel rule. (desk may be reconditioned)

5. One adjustable height fabric swirl type stool (drafting table type) on casters.

6. The drafting table shall be provided with a swivel type drafting table lamp as approved by the Engineer.

7. 6 utility resin tables 30 inches high, minimum top size 30 in. x 60 in. (one for each office, two for conference table and one for general office area).

8. 12 stackable chairs for conference table. Six fabric (6) task/guest chairs

9. One fire-resistant drawer-type safe, legal size, with combination lock. Combination to be reset at the direction of the engineer and revealed only to him.

10. Four legal size metal filing cabinets, four drawers, with lock to remain the property of the Authority. Five (5) shelf metal bookcases.

11. Three electric pencil sharpeners

12. Two fully automatic 12 digit automatic electric calculators with total and grand total functions and two color tape printing. Provide ink and tape for the duration of the project.

13. One plain paper dry-copier capable of accepting originals sized up to 11 x 17 inch and of making reductions or enlargements. Provide maintenance, paper, toner, and all other required copier supplies for the duration of the project.

14. 3 lockers with locks shall be supplied for Field Inspectors.

15. Four round wastebaskets.

16. Provide telephone service consisting of separate line to space, line having two (2) unique telephone numbers and one dedicated line for the telecopier (FAX) machine. Phone line shall be designated for voice service and shall have call waiting and call forwarding. Contractor shall pay monthly telephone charges for all lines.

    1. Provide five (5) digital, two-line capable telephone sets.

17. Provide, activate, and maintain, including monthly service charges, four (4) cellular telephones for use by the MBTA construction project staff. The cellular phones shall have the following features: digital cellular; Group Call; Private Call; walkie-talkie feature; Text/numeric messaging; voice mail; battery strength indicator; signal strength indicator; next text message and voice mail notification; Hi-audio speaker for group and private call. Provide car charger, leather case and two power chargers for each phone.

18. Provide one plain paper telecopier (FAX) machine with a telephone set. Provide paper and other supplies for the duration of the project. All costs for installation, maintenance and removal of the equipment shall be borne by the Contractor.

19. Provide two long distance display pagers for the duration of the project.

20. Provide two battery operated wall clocks

21. Two dust pans and brushes

22. Two 50 LF fiberglass measuring tapes (Engineer's)

23. Two 100 LF fiberglass measuring tapes (Engineer's)

24. One rolling plan rack to be equipped with 10 rods of an approved design.

25. Furnish and maintain two industrial type first aid kits.

26. Provide four (4) heavy duty Maglite metal flashlights with a power source of 3 D-Size batteries.

27. Small microwave oven, 15 CU. FT. refrigerator/freezer, bottled water dispenser with hot and cold outlets. Provide water deliver and cups for the term of the contract.

28. Five (5) 60 in. x 36 in. cork tack boards, installed as directed.

29. Five (5) 60 in. x 36 in. "white boards" with erasable markers, erasers and cleaning fluid, installed as directed.

30. Four (4) portable radios (GP 300 with 1 hour charge) with chargers and spare batteries. Radios shall have external microphones and carrying cases.

31. The following safety equipment without any marking, such as name of the Contractor, shall be furnished to all Authority construction personnel and consultants assigned to the project:

a. Provide twenty-five (25) sets of personal protection equipment for use by MBTA personnel, visitors and MBTA consultants. The equipment for each set shall be as follows:

1. Reflective orange high visibility vest (Item# 31471660)
2. Mini Maglight flashlight (2 AA batteries)
3. Chrome whistle w/cloth hanger

b. Provide (2) sets of flagging equipment.

1. A set of flags (one red, one green, two yellow)
2. Air Horn (with charges for life of Contract)
3. Twenty (20) – 24" High Heavy Duty Orange Cones
4. One (1) 30" High Heavy Duty Orange Cone
5. One Lockable construction storage box, 24 in. x 48 in. x 30 in. H with lock.

32. The following field test equipment shall be provided by the contractor and shall remain the property of the Contractor up upon completion of the work:

c. One complete slump test outfit (reference AASHTO T23 and TI 19) as follows:

1. A slump cone of seamless spun metal, with handles and foot clamps;
2. A tamping rod, 24 in. long, 5/8 in. in diameter with hemispherical end;
3. A sturdy pan (14 gage metal with reinforced rims, 24 in. x 24 in. x 3 in.);
4. A brass-wire briquette brush;
5. A wooden handled steel trowel 3-1/2 in. x 7 in.

d. One concrete curing box, meeting the requirements of AASHTO T23 Section 9, Curamold or equal;

e. Concrete cylinder molds, 4 in. diameter by 12 in. high, single use, meeting the requirements of AASHTO M205 shall be supplied (4 cylinders per 50 cubic yards or fraction thereof). Cylinders shall be approved for use by the Engineer. Three molds shall be submitted for approval prior to the start of the concrete work.

f. One air meter, 1-1/4 cubic foot, Press-Ur-Meter type (reference AASHTO T152 and ASTM C231);

g. Plastic lined sampling bags capable of holding 60 lbs of aggregates, approved and acceptable to the Engineer.

h. Portable Ph and conductivity gage, for water quality measurements, acceptable to the Engineer;

i. Five (5) heavy duty thermometers, pocket-sized and one (1) exterior thermometer.

j. Sling psychrometer with built-in water reservoir and thin bulb, pocket sized, including extra wick material;

33. Provide office hardware and software as described below:

a. Provide and install five (5) computers and printers with cables and supplies as follows:

Convertible Minitower configured as follows, Dell, Compaq, Sony or engineer approved equal:

Intel Pentium 4 minimum 2.0 GHz Processor
Minimum 512 megabytes memory
Minimum 40 GB 7200 rpm hard disk
One minimum 48X CD ROM Drive
One minimum 48X CD RW Drive
One 1.44 MB Floppy Drive
PS/2 Easy Access Keyboard
2 button scroll mouse
Integrated Intel Audio with Speakers
Intel Extreme Graphics
I/O Ports to include a minimum of 4 USB, 2 Serial, 1 Parallel ports
Minimum display; 17 inch flat screen color monitor
Integrated Intel PRO/100 VM Network Connection
Lucent V. 90 56K PCI Win Modem
Surge protection strip

Printer:

HP Color Inkjet CP 1700 PS Printer
Provide Print cartridges, photographic grade paper for 5x7 prints, 8-1/2x11, 11x14, & 11x17 paper for the life of the contract
Minimum ten (10) foot printer cable

Cables & Supplies:

All necessary cables for full connectivity
One power strip with a minimum of six 3 prong outlets and a minimum 10 foot power cord per computer
Quantity 50 blank formatted 3-1/2 inch floppy disks
200 R/RW CD's for office use

b. Provide two (2) hand held PDA's with hard cases; each with two (2) devices to connect to computers, high capacity batteries, and wireless service – Palm Tungsten T3, Sony CLIE TH55, or Dell Axim X3

c. Provide one (1) Sony Mavica MVC-CD250 Digital Camera or approved equal with the following:

Case specifically made for this camera
Suppy of CD's for camera use for the life of contract.
Supply of 8 _ x 11 photographic printer paper

d. Provide software as follows:

Five (5) copies of the latest version of Microsoft Windows
Five (5) copies of the latest version of Microsoft Office Professional Edition including Access
Five (5) copies of the latest version Norton Anti Virus Software.
2 Copies of AutoCAD LT, Latest Edition
2 Copies of Primavera, Latest Edition

e. Provide warranties and upgrades as follows:
Full manufacturer's on-site warranty for a minimum of 3 years, on all hardware
Software upgrades for specified software as available for the duration for the contract

f. Provide phone line/Internet Access as follows:
Dedicated high speed Internet Access

a. Provide books/manuals/codes as follows (including updates for the term of the contract):

- Latest edition of the Massachusetts Building Code (2 copies)
- Latest edition of the Massachusetts Elevator Code
- Latest edition of the Massachusetts Plumbing and Fuel Gas Code
- Latest edition of the Massachusetts Architectural Access board Regulations
- Latest edition of the Massachusetts Board of Fire Prevention Regulations
- Latest edition of the ADAAG Manual (A guide to the American with Disabilities Act Accessibility Guidelines)
- Blue Book Cost data reference (latest edition)
- Means Building Construction Cost Data 2004 (Loose Leaf), Means Building Construction Cost Data 2005 (Loose Leaf), Means Building Construction Cost Data 2006 (Loose Leaf).
- NFPA 101 (2 copies)
- NFPA 130 (2 copies)

34. Provide construction work boots, lined winter coat with removable liner/shell and engraved T logo, heavy duty rain gear, safety glasses, ear protection and hard hats for MBTA personnel. (ten sets)

1.05 MAINTENANCE OF FIELD OFFICE

A. The Contractor shall provide maintenance and custodian service which shall include the following:

1. Daily trash removal

2. Weekly floor cleaning and waxing

3. Clean windows twice a month

4. Necessary repairs to damaged, vandalized or defective parts of equipment

5. Continue maintenance for 120 days after final acceptance of the work and keep the field offices clean, orderly, and in working condition at all times

6. Protect the field offices and their contents throughout the 24 hours of the day and be responsible for any loss of property of employees of the Authority housed therein, due to either fire, theft, vandalism or other causes.

7. Title to the field offices and equipment shall remain in the name of the Contractor, except as specified herein

8. Payment of regular electrical utility charges, internet charges, cell phone charges and regular telephone charges will be the responsibility of the contractor.

1.06 INSURANCE AND REPLACEMENT

A. At the time the field offices are made available to the Authority, the Contractor shall furnish evidence to the Engineer that insurance has been obtained which will protect the Authority and/or its employees against loss of property in the office from fire, theft, storm, or flood.

B. The insurance shall be satisfactory to the Authority in form, coverage and substance in the amount of $10,000 non-deductible. The insurance shall be kept in effect 120 days after final acceptance of the work, with evidence of all necessary renewals being promptly forwarded to the Engineer.

C. In case of fire, theft, vandalism, or breakdown, all equipment involved shall be repaired or replaced by the Contractor within 48 hours and in the event a field office is destroyed or rendered untenable for any reasons, it shall be replaced within two weeks or as directed.

1.07 DEMOBILIZATION OF ENGINEERS FIELD OFFICE

A. The Contractor shall not sooner than one hundred twenty (120) days or longer than one hundred fifty (150) days from the final acceptance date of the work, take possession of the field offices, and all other associated Engineer field office improvements to include water cooler, drafting table stools, drafting tables, safe, pagers, copier and facsimile machines, as well as fire extinguishers, desk chairs, folding chairs, filing cabinets, lockers, wastebaskets, and telephones. The Contractor shall perform the necessary work to leave the Engineer's field office site in a neat and orderly condition.

1.08 MEASUREMENT

A. All work included in this Section will be paid for at a Lump Sum price, which price and payment therefore shall constitute full compensation for all work as specified.

1.09 PAYMENT

A. Installation of potable water supply, sanitary waste disposal, telephone and electrical service to the field offices, including all associated materials and labor incidental to

providing the services, shall be included under the contract lump sum price for the Field Office.

B. Payment for the Field Office and all other work specified in this section will be made at the contract lump sum price for Field Office; Payment Item No. 0130.110, which price shall include full compensation for all material and work required. The basis of payment will be 50% of the lump sum price stipulated under Payment Item No. 0130.110, payable on the first estimate subsequent to complete installation of the field office with all equipment required. The remaining 50% will be pro-rated in equal amounts on each subsequent monthly estimate. The final month pro-rate amount will not be paid until the final payment. No separate payment will be made for utilities, services, suppliers, maintenance, insurance, incidentals, and all costs therewith shall be included in the lump sum price.

1.10 PAYMENT ITEM

Item No.	Description	Unit
0130.110	Field office	LS

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

1.01 DESCRIPTION

A. This Section specifies the general requirements for protection and final clearing of floors, provision of operations and maintenance manuals, and provision of as-built drawings in accordance with Standard Specifications Division 1 - General Requirements Section 01700, except as modified herein.

1.04 OPERATIONS AND MAINTENANCE MANUALS

B. Each subcontractor or trade through the Contractor shall fully explain the contents of the manuals and walk through the facility with individuals designated by the Authority.

C. Maintain on site during construction, and submit as part of Contract Closeout record documents, a completely documented file concerning any contaminated and/or hazardous wastes, soils, or materials encountered as part of or during the course of the work under this Contract. Documents shall include copies of submittals, correspondence, reports, removal documentation, test results, manifests, disposal receipts, permits, final disposition, or any other pertinent information required by governing agencies or other authorities.

1.05 AS-BUILT DRAWINGS

A. The Contractor shall maintain at the site a set of blueline prints and reproducible drawings on which will be accurately and clearly shown the actual installation of all work under this Contract and any variation from the Contract Plans, as Approved by the Authority including changes in sizes, locations and dimensions. Subcontractor changes shall be recorded. The Authority will provide one set of blueline on white drawings and the Contractor shall provide one set of double-matt reproducible mylar drawings from which to do this work.

B. Upon completion of the Work and after checking the subcontractors' as-built drawings, and all required drawings, submit a complete set of marked-up record drawings to the Engineer by registered mail in time to be used for the final inspection, and acceptance and for verification by the Engineer. Availability of as-built drawings shall be a prerequisite to scheduling a final inspection of the Contract and these drawings and the Contract Documents will be used in checking completion of the Work. Non-availability of as-built drawings or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Authority until such time as the drawings are available or the discrepancy has been corrected. Upon completion of the work, the as-built drawings shall become the property of the Authority. If as-built drawings are not maintained as required herein to the satisfaction of the Engineer, the Authority will deduct from monthly partial payments, an amount representing the estimated monthly cost of maintaining the as-built drawings, and will continue deduction of the 5 percent retainage after 50 percent completion of the Contract, as provided in Section 01150, Article 1.06, 1.07.

C. At the conclusion of the work, the Contractor shall deliver to the Authority a complete set of reproducible record Drawings which shall be transparencies on mylar and 35mm Microfilm and Aperture Cards showing the entire work as actually installed. These record Drawings shall include changes that took place during the Addenda period and the construction period. This submittal shall be

approved as being complete by the Engineer, and will constitute a contract requirement. Approval of the final as-built submittal is required before final payment.

D. A clean sepia of all shop drawings reflecting any changes shall be submitted to the Engineer incorporating all review comment along with the as-built drawings. Yellow line/red line corrections will not be accepted.

1.05A SUBSTANTIAL COMPLETION

A. Procedure:

1. Prepare and submit a list of outstanding items, to be completed by the contractor. This will form the basis of a Punch List.

2. Within a reasonable time after receipt of the list, the Engineer will inspect to determine status of completion of each item or add new items as necessary.

3. Should the Engineer determine that the Work is not substantially complete:

   a. The Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.

   b. Contractor will remedy the deficiencies and notify the Engineer when ready for re-inspection.

   c. The Engineer will re-inspect the work.

4. When the Engineer concurs that the Work is substantially complete:

   a. The Engineer will prepare a 'Certificate of Substantial Completion", accompanied by the Contractor's list of items to be completed or corrected, as verified by the Engineer.

   b. The Engineer will submit the Certificate to the Authority as to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

B. Final Completion:

1. Prepare and submit the notice required by the General Conditions.

2. Verify that the Work is complete including, but not necessarily limited to, the items mentioned in the General Conditions.

3. Certify that:

   a. Contract Documents have been reviewed;

   b. Work has been inspected for compliance with Contract Documents;

   c. Work has been completed in accordance with Contract Documents;

   d. Equipment and systems have been tested as required, and are operational;

e. Work is completed and ready for final inspection.

4. The Engineer will make an inspection to verify status of completion.

5. Should the Engineer determine that the Work is incomplete or defective:

   a. The Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.

   b. Remedy the deficiencies promptly, and notify the Engineer when ready for re-inspection.

6. When the Engineer determines that the work is acceptable under the Contract Documents, he/she will request the Contractor to make closeout submittals.

C. Closeout submittals include, but are not necessarily limited to:

1. Project Record Documents described in Section 01300 and this Section;

2. Operation and maintenance data for items so listed in pertinent other Sections of these Specifications, and for other items when so directed by the Engineer;

3. Warranties, certificates, and bonds;

4. Keys and keying schedule;

5. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:

   a. Certificates of Inspection;

6. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service as may be needed.

7. Certificates of Insurance for products and completed operations;

8. Evidence of payment and release of liens.

END OF SECTION

SECTION 02000

SUBSURFACE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies subsurface data.

B. The attached document, titled " MAVERICK STATION MODERNIZATION PROJECT-GEOTECHNICAL DATA REPORT", prepared by Jacobs Civil Inc., and dated August, 2003, is attached after this Page.

B. The Contractor shall review records of exploration logs that may include but are not limited to boring logs, test pit logs, analytical results and other pertinent data for the site. After obtaining approval of the MBTA, perform any additional subsurface explorations deemed necessary according to all applicable procedures established for the site at no additional cost to the MBTA.

C. Subsurface Data for the site including boring logs are appended herewith and are made part of this Specification.

D. Aforementioned exploration data are for the general information and are accurate only at the particular locations and times the subsurface explorations were made. It is the Contractor's responsibility to make interpretations and draw conclusions based on the character of materials to be encountered, his expert knowledge of the area, and his knowledge of construction techniques.

1.08 MEASUREMENT AND PAYMENT

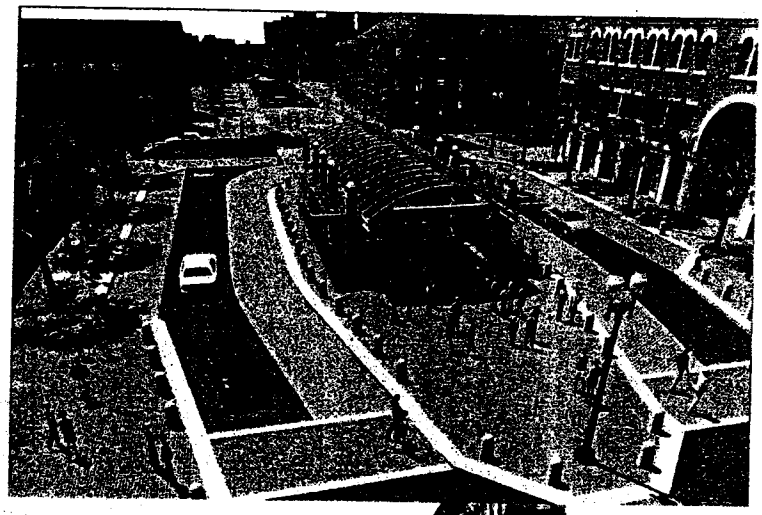
A. No separate measurement and payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

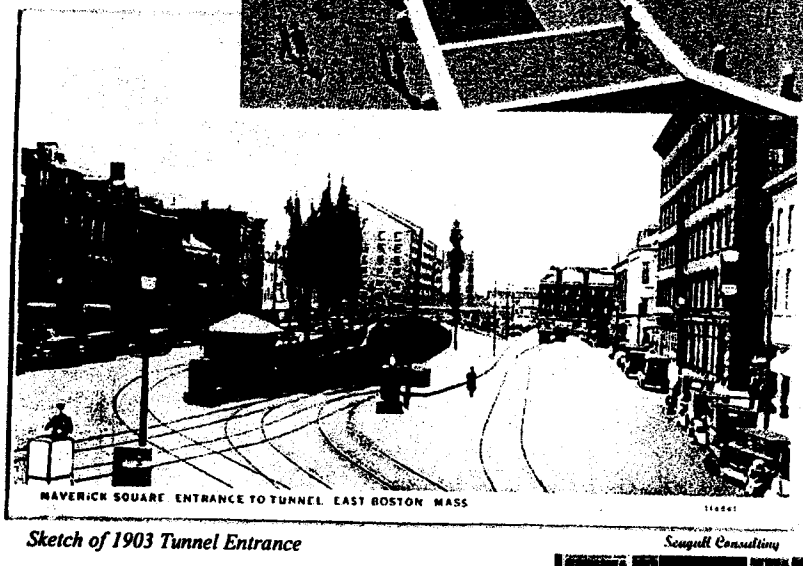
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Modernization of Maverick and Orient Heights Stations
MBTA Contract No. S9PS04

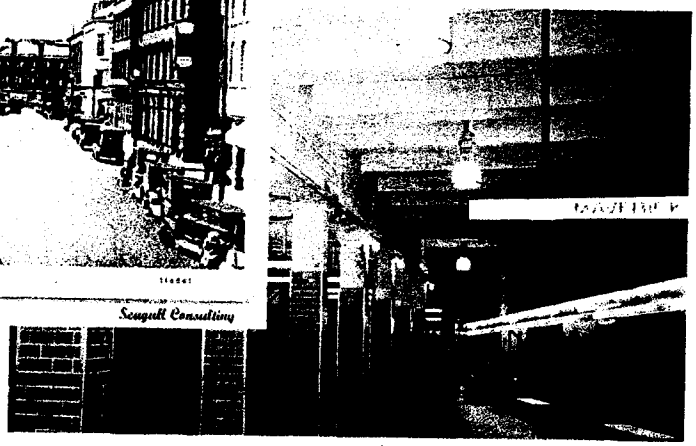
Maverick Station Modernization Project

Geotechnical Data Report





Sketch of 1903 Tunnel Entrance



Submitted to

DMJM + HARRIS

by

JE JACOBS

Jacobs Civil Inc.

August 2003

Modernization of Maverick Station

Geotechnical Data Report

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A. Introduction

A.1. General

This geotechnical data report contains the procedures and results of the subsurface investigation, and field tests for the Maverick Station Modernization Project. The purpose of this report is to present the investigation results without interpretation to provide information for design of the project components.

A.2. Scope of Work

This report was prepared by Jacobs Civil Inc. in accordance with the scope of work under the contract between Jacobs Civil Inc., formerly Sverdrup Civil, Inc., and DMJM + Harris, Inc. (DMJM) for work on the Maverick Station Rehabilitation Project, Massachusetts Bay Transportation Authority (MBTA) Contract #S9PS04. The geotechnical scope of work included the following tasks:

- conduct a geotechnical investigation program, excluding environmental field screening;
- report the results of the investigation, and;
- provide geotechnical recommendations for design of the project components.

This data report addresses the first two items in the scope of work, while the third item is covered in a separate memorandum. Another subconsultant, ATC Associates, was responsible for determination of subsurface environmental conditions at the site, although the field investigations for both tasks were combined to some extent to avoid duplication of effort.

This geotechnical data report should be included in contract documents issued to contractors interested in bidding for the restoration work. Contractors bidding for the restoration work must be responsible for their own interpretation of the geotechnical conditions at the site and for anticipating impacts on their work.

B. Project Description

The Modernization of Maverick Station Project represents the MBTA's next major initiative in completing systemwide improvements on the Blue Line. Modernization will improve operations and customer friendliness at the facility, and contribute to improvements in the neighborhood adjacent to the station.

The goals of this modernization program include accommodation of six-car trains, modernization of systems, seamless coordination with other adjacent MBTA projects, and improvements to station operations, station appearances, and neighborhood quality. A new headhouse will be added at the southern end of the station, and extensive improvements made to the existing headhouse. A number of columns will be removed to improve the platform area, which will require demolition of the existing base slab and installation of new foundations. In addition, in the vicinity of areas where extensive demolition of the existing structure is proposed, waterproofing of the tunnel will be improved.

C. Subsurface Conditions

C.1. Local Geology

The site is located within a geologic region known as the Boston Basin. The basin area consists primarily of Precambrian to Cambrian age sedimentary, metamorphic, and volcanic rocks. The Basin is east-northeast trending, widening toward the coast. The sedimentary rocks within the Boston Basin include conglomerates, sandstones, argillites, and volcaniclastic sediments. The predominant bedrock type beneath the site is Cambridge Argillite (USGS Bedrock Geological Map of Massachusetts, 1983). The argillite is typically fine-grained, very thinly bedded, metasedimentary rock. Also, numerous intrusive sills and dikes

of diabase, andesite, and diorite penetrate the argillite bedrock in the general area of the Boston Basin. The borings performed for this project did not penetrate bedrock.

The area was extensively glaciated during the Wisconsin Period. Repeated retreats and readvances of the glacier between about 18,000 and 12,000 years ago fractured and scoured the bedrock, deepening the bedrock throughout the Boston Basin. In general, the bedrock surface within the Boston Basin slopes gently downward toward the east, but locally it is extremely irregular due to the existence of faults, dikes, and glacially scoured and erosional depressions. Glaciation and retreat left a complex sequence of soil deposits including basal tills, moraines, drumlins, marine and glaciomarine deposits, and outwash. During glacial retreats, fine-grained soils, including silts, clays, and organic material, were carried to the ocean by rivers and streams of glacial meltwater and were deposited in quiet marine waters. Finally, in recent times, fill was placed in many areas of the Boston shoreline, including East Boston, to reclaim low-lying intertidal, saltmarsh and/or submerged areas as Boston expanded.

C.2. Site History

The project site is located in the City of Boston neighborhood of East Boston. In pre-colonial times, East Boston was composed of three islands, each consisting of a hill, with inter-tidal and salt marsh areas between them. These islands and several smaller ones in the old Boston Harbor were connected and extended by over 150 years of filling operations to make up the neighborhood of East Boston. Figure 1 shows the approximate 1775 Shoreline of East Boston superimposed on a 1994 map published by Boston Redevelopment Authority (BRA). As shown on the Figure, portions of the northern section of the project site are located in an area that was formerly occupied by the Island known as William Hill. The remainder of the site was an intertidal and salt marsh area that was later filled.

A subway station was first built at the site in 1903, and was subsequently re-built and expanded in 1923. The 1923 station design/as-built drawings provide significant information on conditions existing prior to construction of the existing station, both with respect to the location and design of the original 1903 tunnel, but also regarding numerous adjacent structures that have since been demolished, particularly south of Sumner Street. It is probable that abandoned, buried foundations from these demolished buildings, and sections of the abandoned 1903 tunnel are still present beneath the ground surface at the site.

C.3. Subsurface Exploration

Under the supervision of Jacobs Civil Inc., two borings were conducted in the vicinity of the station to obtain subsurface information for the project. One boring, MSB-2, was performed on May 22, 2003 on Sumner Street east of the station, and MSB-3 was performed on May 21, 2003 on Henry Street. The locations of the borings are shown on Figure 2. The individual boring logs are included in Appendix A. Standard Penetration Tests (SPT) with split spoon sampling were typically performed at five-foot intervals of depth to establish the density or consistency of in-situ soils and to obtain soil samples. No survey was conducted, therefore boring locations and elevations were estimated based on the site plans provided by DMJM + Harris. All elevations listed in this report refer to the project MBTA datum.

Additional borings were also performed under the supervision of ATC Associates at the north headhouse area, both at platform level (Borings SB-1 and SB-2) and at ground surface (SB-3 through –6). Copies of these boring logs and a location plan are included in Appendix B and are discussed in more detail in the following section of this report.

We had planned to perform additional borings at the south headhouse area at both ground surface and platform level, but due to right-of-entry issues, it was not possible to access these areas to perform an investigation. In addition, monitoring wells had been proposed in all geotechnical borings drilled from the

ground surface, but problems with completing the necessary permits with the City of Boston prevented their installation.

The fill layer encountered in the borings typically consists of mostly sand and gravel with miscellaneous pieces of man-made materials such as asphalt, bricks, and glass. The fill thickness ranges from 0.5 feet in MSB-2 to 3.5 feet in MSB-3. It was difficult to distinguish whether the glaciomarine material encountered at shallow depths was fill or natural, since the fill may have been obtained from local borrow pits. The glaciomarine deposits below the fill generally consisted primarily of clay containing variable percentages of silt, sand and gravel. The presence of large pieces of gravel and cobbles or even boulders are common within this type of deposit, often leading to the occasional high N-values and difficulty in advancing the boreholes experienced during drilling. Sand layers are also typical of this deposit as found in Boring MSB-2 between approximate Elevation 88.5 ft to 69 ft. Standard Penetration Test (SPT) N-values performed in the glaciomarine deposit ranged from 27 to 141 blows per foot, indicating a very stiff to hard soil. One N-value of 11 was obtained in MSB-2 at a depth of 10 feet. The glaciomarine deposit was present until the borings were terminated at depths of 55.5 and 56 feet in Borings MSB-2 and -3 respectively.

C.4. Groundwater

The ground water levels observed in the borings indicate the ground water level ranged from approximate Elevation 107 ft to 110 ft. These measurements were taken with a weighted tape inside the casing at the completion of drilling and prior to pulling the augers/casing and backfilling. Based on observations from the nearby monitoring well from an adjacent project presented in Appendix B, the groundwater at the project site is tidal and is expected to fluctuate.

D. Geotechnical Information by Others

Available information obtained by others pertaining to the subsurface conditions in the general vicinity of the project area is included in Appendix B. The available information includes:

- ATC Associates Inc. conducted soil sampling activities on May 16, 2003 on the platform and street levels in the vicinity of the north headhouse. Two soil borings (SB-1 and SB-2) were performed with a coring device and hand auger on the platform level. Soil samples obtained from the platform borings consisted of dense, moist gray clays with silt and gravel. ATC also conducted four additional borings (SB-1 thru SB-6) by means of direct push technologies and hand augering on the street level. The logs for borings SB-1 thru SB-6 and the location of the borings are included in Appendix B. Groundwater was not encountered in their borings. For the results of the environmental sampling conducted by ATC, see their report titled "Soil Sampling Results – Maverick Station" dated July 14, 2003.

- Boring logs compiled by the Boston Society of Civil Engineers.

- A log for a monitoring well installed by GEI Consultants, Inc. two blocks from the project site. A table including monitoring well readings is also included for information.

E. Information on Adjacent Buildings

Research was conducted into the foundations of the buildings surrounding the project site to assist in evaluating potential impacts from the project construction. Records such as building permits from the City of Boston Inspectional Services Department and drawings from the Boston Housing Authority development were examined, and the information is summarized in a table presented in Appendix C.

F. References

ATC Associates, Inc., "Soil Sampling Results – Maverick Station, Modernization of Maverick and Orient Heights Stations, MBTA Contract No. S9PS04" submitted to DMJM + Harris, dated July 14, 2003.

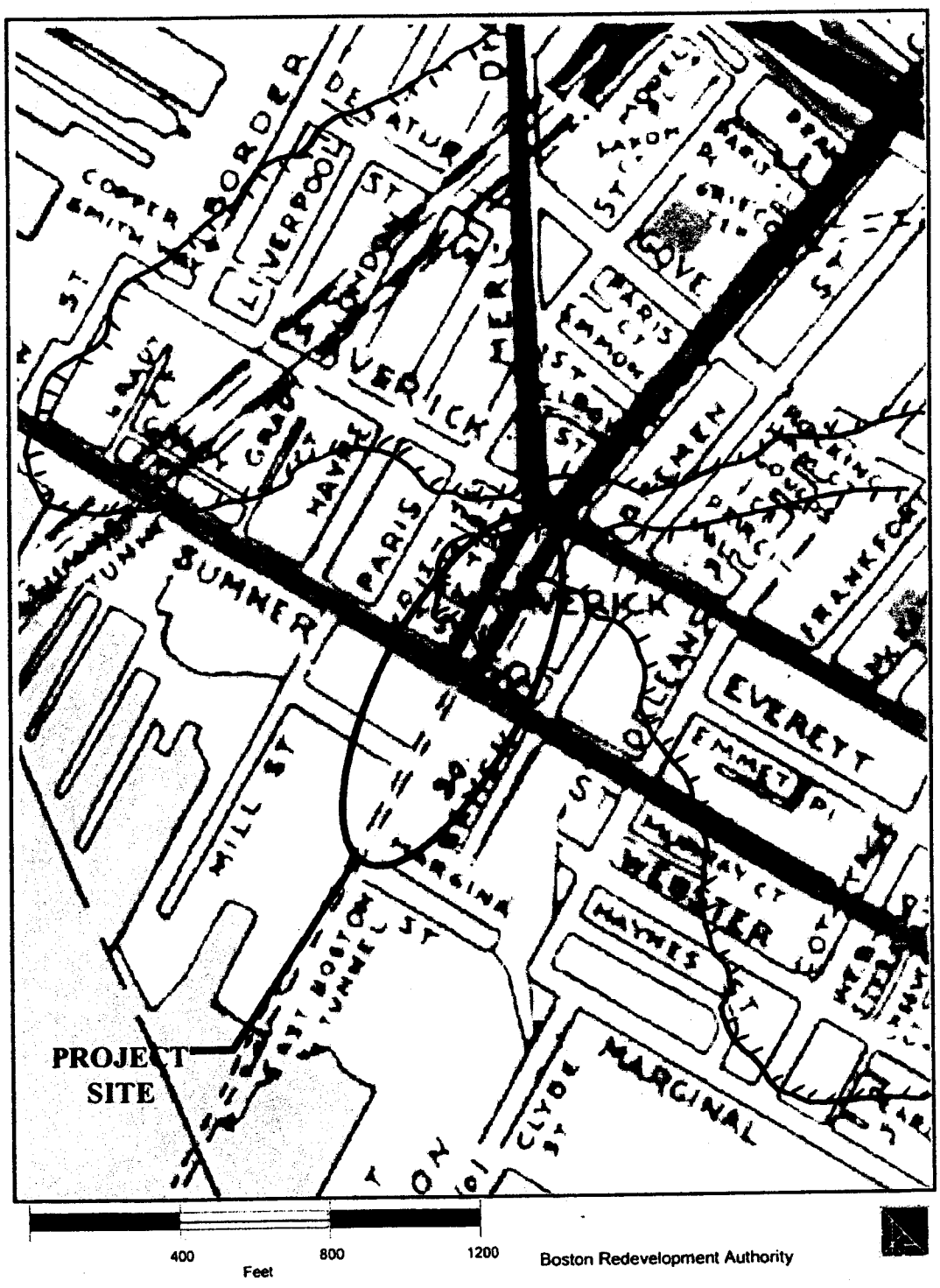
Boston Society of Civil Engineers, Boring Data from Greater Boston, Boston Society of Civil Engineers, Boston, Massachusetts, 1961.

Department of the Interior, United States Geological Survey, "Bedrock Geological Map of Massachusetts", 1983.

"Preliminary Design Report, Submitted to Massachusetts Water Resources Authority under East Boston Branch Sewer Relief Project, MWRA Contract No. 6256", Submitted by Sverdrup Civil, Inc., September. 2001.

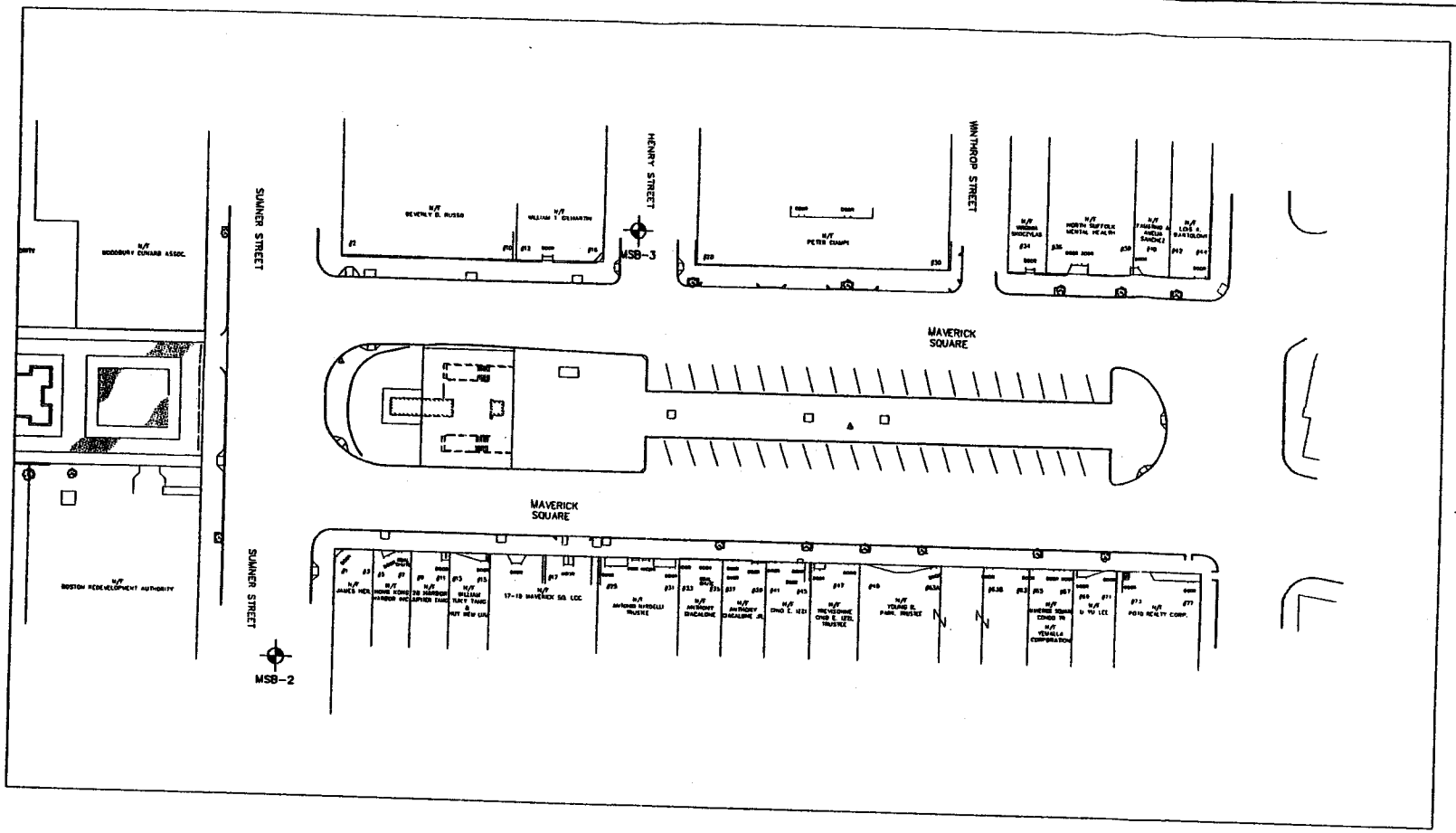
FIGURES

Figure 1: 1775 Shoreline of the Project Area
Figure 2: Boring Location Plan



1775 SHORELINE OF THE PROJECT AREA SUPERIMPOSED ON THE "MAJOR THOROUGHFARE SYSTEM" PUBLISHED BY THE BRA, JULY 1994

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY MODERNIZATION OF MAVERICK STATION MBTA CONTRACT NO. S9PS04	JE JACOBS Jacobs Civil Inc.	1775 SHORELINE OF THE PROJECT AREA	AUGUST 2003 FIGURE 1



LEGEND

⊕ – SOIL BORING

MSB-2

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

MAVERICK SQUARE STATION BLUE LIN
MODERNIZATION OF MAVERICK STATION
CONTRACT NO. S8PS04

BORING LOCATION PLAN

JACOBS

JACOBS CIVIL INC.
BOSTON, MA

HORIZ: 1" = 30'-0"				FIGURE 2
VERT: NA				
DATE: AUGUST 2003	JJ	JJ	JT	

Appendix A: Jacobs Civil Inc. Boring Logs

LOG OF TEST BORING

JACOBS

PROJECT	Maverick Station Modernization
LOCATION	East Boston - Sumner Street
OWNER	Mass. Bay Transportation Authority
JOB NUMBER	E2406100
BORING NO.	MSB-2
SHEET	1 OF 2
INSPECTOR	C. Nagata
CONTRACTOR	Earth Exploration, Inc.
DRILLER	T. Tucker
ELEVATION	121
METHOD OF DRILLING	
0.0	Wash Boring w/4" Casing
44	Wash Boring
54	Split Spoon Sample
55.5	Boring Terminated
GROUNDWATER READINGS	
DATE/TIME	5/22/03 at 14:00
DEPTH (ft)	14.2
REMARKS	Upon Completion in Casing
DRILL RIG	B-57 Truck
SPT HAMMER	140 lb Safety
DATUM	FT MBTA
GRID N	780662
COORD E	2959722
DATE START	5/22/03
DATE END	5/22/03

DEPTH (ft)	STRATA SYMBOL	SAMPLE DATA	REC. (in)/(%)	SAMPLE NO.	ELEV.	FIELD CLASSIFICATION AND REMARKS
		30 19 16 20	18	SS-1	120.5	- 6" Asphalt
					119.5	6"-1.5': Well graded sand and gravel (SW) - mostly fine to coarse sand, some fine to coarse gravel, trace slag, black, wet - FILL.
		30 100/3"	5	SS-2		1.5'-2.5': Lean Clay (CL) - mostly clay, low plasticity, gray, moist, PP = 4.0 tsf - GLACIOMARINE DEPOSIT/POSSIBLE FILL
5						Lean clay with gravel (CL) - mostly clay, some fine to coarse gravel, trace fine to coarse sand, gray, wet (piece of rock in shoe tip) - GLACIOMARINE DEPOSIT/POSSIBLE FILL
		5 6 5 5	8	SS-3		Sandy lean clay with gravel (CL) - mostly silty clay, some fine to coarse sand, little fine to coarse gravel, gray, trace brown organics, wet - GLACIOMARINE DEPOSIT
10						
		15 17 20 30	8	SS-4		Lean clay with gravel (CL) - mostly silty clay, little to some fine gravel, trace fine to coarse sand, medium plasticity, light brown, wet - GLACIOMARINE DEPOSIT
15						
		10 14 34 50	24	SS-5		19'-20': Lean Clay (CL) - mostly silty clay, low plasticity, light brown/gray, moist (PP = 3.8 tsf) - GLACIOMARINE DEPOSIT
20						20'-21': Silty sand with gravel (SM) - mostly fine sand, some silt, little fine to coarse gravel, brown, moist - GLACIOMARINE DEPOSIT
		100/4"	0	SS-6		- Very hard drilling from 21' to 24'
25						- No Recovery
						- Hard drilling from 24' to 26.5'
		15 21 14 14	8	SS-7		Lean clay with gravel (CL) - mostly silty clay, some fine to coarse gravel, little sand, medium plasticity, gray, moist - GLACIOMARINE DEPOSIT
30						
					88.5	
		22 21	14	SS-8		Well graded sand with gravel (SW) - mostly fine to coarse sand, some fine to coarse gravel, trace silt, trace clay, brown, wet - GLACIOMARINE DEPOSIT
35						

Page 1: 0-35 feet, Page 2: 35-80 feet.
Each subsequent page displays 45 feet.

SAMPLES CLASSIFIED IN ACCORDANCE WITH ASTM D-2488 UNLESS OTHERWISE NOTED.

COHESIVE SOIL		NON-COHESIVE SOIL		RELATIVE PROPORTIONS OF SOIL COMPONENTS	
BLOWS/FT	CONSISTENCY	BLOWS/FT	DENSITY		
0 - 2	VERY SOFT	0 - 4	VERY LOOSE	< 10%	TRACE
3 - 4	SOFT	5 - 10	LOOSE	15 - 25%	LITTLE
5 - 8	MEDIUM STIFF	11 - 30	MEDIUM DENSE	30 - 45%	SOME
9 - 15	STIFF	31 - 50	DENSE	50 - 100%	MOSTLY
16 - 30	VERY STIFF	51+	VERY DENSE		
30 +	HARD				

LEGEND

AUGER (AS) | ROCK CORE (RC) AND ROD (%) REC (%) | $^{4}/_{6}$ SPLIT-SPOON (SS) AND BLOW COUNTS PER 6" REC (in) | UNDISTURBED (U)-SHELBY TUBE, (P)-PISTON | JAR (JS) | BAG (B)

* REFER TO THE SHEET ENTITLED "KEY TO DESCRIPTION AND CLASSIFICATION OF SUBSURFACE MATERIALS" FOR ADDITIONAL SYMBOLOGY.

BORING NO. MSB-2

LOG OF TEST BORING

JACOBS

PROJECT	Maverick Station Modernization
LOCATION	East Boston - Sumner Street
OWNER	Mass. Bay Transportation Authority
JOB NUMBER	E2406100

BORING NO. MSB-2

SHEET 2 OF 2

DEPTH (ft)	STRATA SYMBOL	SAMPLE DATA	REC. (in)/(%)	SAMPLE NO.	ELEV.	FIELD CLASSIFICATION AND REMARKS
		20 16				- Very hard drilling from 37' to 39'
40		20 100	3	SS-9		Well graded sand with gravel (SW) - Mostly fine to coarse sand, some fine to coarse gravel, trace silt, trace clay, brown, wet - GLACIOMARINE DEPOSIT
45		24 33 35 42	10	SS-10		Well graded sand with gravel (SW) - Mostly fine to coarse sand, some fine to coarse gravel, trace silt, trace clay, brown, wet - GLACIOMARINE DEPOSIT - Very hard drilling from 46' to 49'
50		24 79	2	SS-11		Well graded sand with gravel (SW) - Mostly fine to coarse sand, some fine to coarse gravel, trace silt, trace clay, brown, wet - GLACIOMARINE DEPOSIT
					69.0	
55		30 41 100	10	SS-12		Silt with gravel (ML) - mostly silt, little fine to coarse gravel, trace fine sand, gray, wet - GLACIOMARINE DEPOSIT
					65.50	Boring Terminated at 55.5'
60						
65						
70						
75						

Note: See Sheet 1 for test boring information, legend, and notes.

BORING NO. MSB-2

LOG OF TEST BORING

JACOBS

PROJECT	Maverick Station Modernization	BORING NO.	MSB-3
LOCATION	East Boston - Henry Street		
OWNER	Mass. Bay Transportation Authority		
JOB NUMBER	E2406100		SHEET 1 OF 2

INSPECTOR	C. Nagata	CONTRACTOR	Earth Exploration, Inc.	DRILLER	T. Tucker
METHOD OF DRILLING		GROUNDWATER READINGS		DRILL RIG	B-57 Truck
0.0	Wash Boring w/4" Casing	DATE/TIME	DEPTH (ft)	REMARKS	SPT HAMMER 140 lb Safety
39	Wash Boring	5/21/03	11.8	Upon Completion in Casing	
54	Split Spoon Sample				
56	Boring Terminated				

ELEVATION		122	
DATUM		FT MBTA	
GRID	N	780561	
COORD	E	2959992	
DATE START		5/21/03	
DATE END		5/21/03	

DEPTH (ft)	STRATA SYMBOL	SAMPLE DATA	REC. (in)/(%)	SAMPLE NO.	ELEV.	FIELD CLASSIFICATION AND REMARKS
		21 20 21 22	10	SS-1	121.5	- 6" Asphalt Well graded sand with gravel (SW) - mostly fine to coarse sand, some fine to coarse gravel, trace cinder block, light brown, wet - FILL
					118.5	- Hard drilling from 0.5' to 3.5', red brick pieces in wash.
5		22 29 38 30	8	SS-2		Clayey sand with gravel (SC) - mostly fine to coarse sand, some fine to coarse gravel, little clay, light brown, wet - GLACIOMARINE DEPOSIT
10		22 45 60	18	SS-3		Clayey sand with gravel (SC) - mostly fine to coarse sand, some fine to coarse gravel, little clay, light brown, wet - GLACIOMARINE DEPOSIT - Hard drilling from 10.5' to 11.5'
15		25 100	11	SS-4		Clayey sand with gravel (SC) - mostly fine to coarse sand, some fine to coarse gravel, little clay, light brown, wet - GLACIOMARINE DEPOSIT
20		12 22 25 40	7	SS-5		Lean clay (CL) - mostly silty clay, little fine to medium sand, medium plasticity, gray, wet (PP = 4.0 tsf) - GLACIOMARINE DEPOSIT
25		13 20 43 47	14	SS-6		Lean clay (CL) - mostly silty clay, trace fine gravel, trace fine sand, medium plasticity, gray, wet (PP = 4.25 tsf) - GLACIOMARINE DEPOSIT
30		17 27 29 28	24	SS-7		Lean clay (CL) - mostly silty clay, trace fine gravel, trace fine sand, medium plasticity, gray, wet (PP = 3.8 tsf) - GLACIOMARINE DEPOSIT - Hard drilling from 31' to 33'.
35		3 6	18	SS-8		34'-34.5': Poorly graded sand (SP) - mostly fine sand, some medium sand, trace silt, gray, moist - GLACIOMARINE DEPOSIT

Page 1: 0-35 feet, Page 2: 35-80 feet,
Each subsequent page displays 45 feet.

SAMPLES CLASSIFIED IN ACCORDANCE WITH ASTM D-2488 UNLESS OTHERWISE NOTED.

COHESIVE SOIL		NON-COHESIVE SOIL	
BLOWS/FT	CONSISTENCY	BLOWS/FT	DENSITY
0 - 2	VERY SOFT	0 - 4	VERY LOOSE
3 - 4	SOFT	5 - 10	LOOSE
5 - 8	MEDIUM STIFF	11 - 30	MEDIUM DENSE
9 - 15	STIFF	31 - 50	DENSE
16 - 30	VERY STIFF	51 +	VERY DENSE
30 +	HARD		

RELATIVE PROPORTIONS OF SOIL COMPONENTS	
< 10%	TRACE
15 - 25%	LITTLE
30 - 45%	SOME
50 - 100%	MOSTLY

LEGEND

AUGER (AS) | ROCK CORE (RC) AND ROD (%) REC (%) | SPLIT-SPOON (SS) AND BLOW COUNTS PER 6" REC (in) | UNDISTURBED (U)-SHELBY TUBE, (P)-PISTON | JAR (JS) | BAG (B)

*REFER TO THE SHEET ENTITLED "KEY TO DESCRIPTION AND CLASSIFICATION OF SUBSURFACE MATERIALS" FOR ADDITIONAL SYMBOLOGY.

BORING NO. MSB-3

LOG OF TEST BORING

JACOBS

PROJECT	Maverick Station Modernization
LOCATION	East Boston - Henry Street
OWNER	Mass. Bay Transportation Authority
JOB NUMBER	E2406100

BORING NO. MSB-3

SHEET 2 OF 2

DEPTH (ft)	STRATA SYMBOL	SAMPLE DATA	REC. (in)/(%)	SAMPLE NO.	ELEV.	FIELD CLASSIFICATION AND REMARKS
		21				34.5'-35.5': Sandy clay (CL) - some clay, some fine sand, little silt, trace to little fine gravel, low plasticity, gray, moist - GLACIOMARINE DEPOSIT
40		21 34 100/3"	15	SS-9		
						- Hard drilling from 41' to 44'.
45		30 41 50 65	0	SS-10		- No Recovery
		12 17 30 35	18	SS-11		Lean clay (CL) - mostly silty clay, trace fine gravel, medium plasticity, gray, wet (PP = 1.2 tsf) - GLACIOMARINE DEPOSIT
50						
		16 34 39 50	24	SS-12		Lean clay (CL) - mostly silty clay, trace fine gravel, medium plasticity, gray, wet (PP = 3.7 tsf) - GLACIOMARINE DEPOSIT
55					66.00	Boring Terminated at 56'
60						
65						
70						
75						

Note: See Sheet 1 for test boring information, legend, and notes.

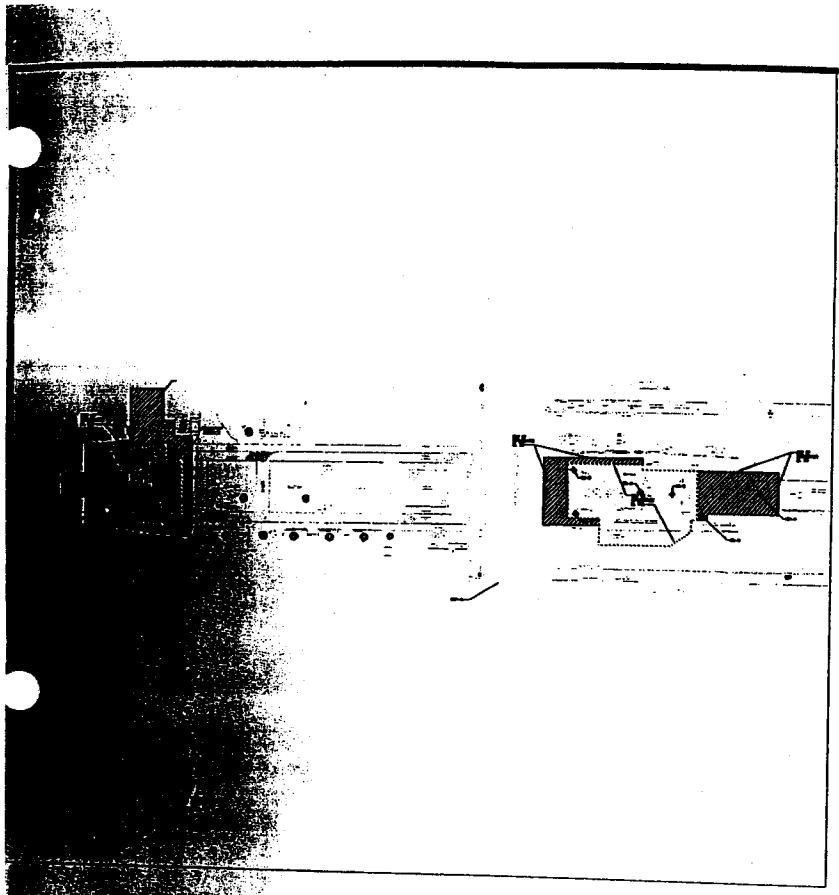
BORING NO. MSB-3

Appendix B: Information By Others

1. Environmental Borings for this Project performed by ATC Associates Inc.
2. Boring logs compiled by the Boston Society of Civil Engineers.
3. Monitoring well installed by GEI Consultants, Inc. for the MWRA

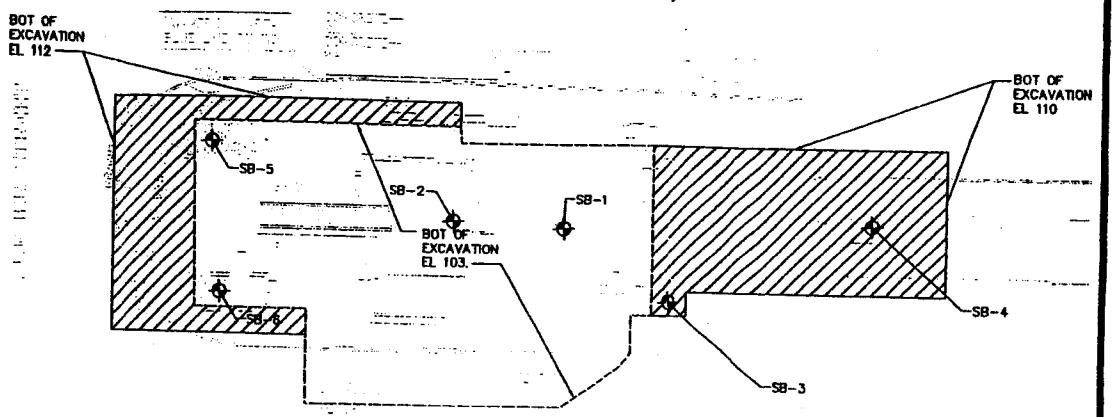
Appendix B: Information By Others

1. Environmental Borings for this Project performed by ATC Associates Inc.



SITE PLAN

DETAIL



EXTERIOR SOIL BORING

INTERIOR SOIL BORING

PROPOSED STREET LEVEL EXCAVATION

PROPOSED PLATFORM LEVEL EXCAVATION

SOIL BORING PLAN
N. HEADHOUSE

MAVERICK SQUARE STATION
BLUE LINE
EAST BOSTON, MASSACHUSETTS

PROJECT NUMBER: 60.04964.0004	FIGURE NUMBER: 2
SCALE: NTS	CHECKED BY: SL
DRAWN BY: SL	REVISED BY:
DRAWING FILE: SITE	

VATC ASSOCIATES INC.
600 West Cummings Park, Suite 5500
Woburn, Massachusetts 01801-6350
Tel:(781)932-9400 Fax:(781)932-6211

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

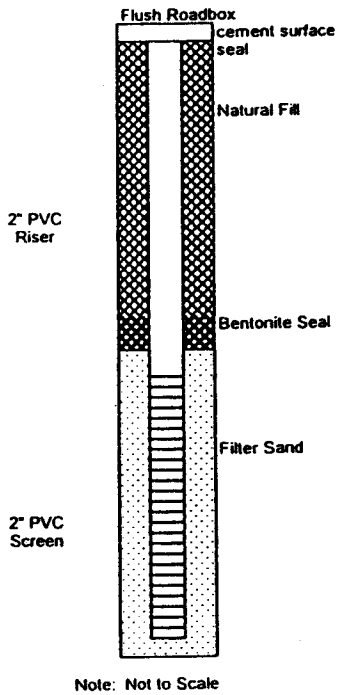
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	Core/Hand Auger
SAMPLER METHOD:	Hand Auger
CASING DIAMETER:	NA

WELL/BORING NO.:	SB-1
WEATHER:	
ATC INSPECTOR:	S.Low
SURFACE ELEVATION:	Platform
DEPTH TO WATER:	NA
ATC Project Number:	60.04694.004
Task Number:	1

Sample No.	Recovery/ Penetration (in/in)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-1	NA	NA	2.8	1		Concrete
				2		Grey, dense, SILT and CLAY, some GRAVEL, trace black material, mois
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

PLASTIC SOILS COHESIVE DENSITY

0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

LEGEND:

ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

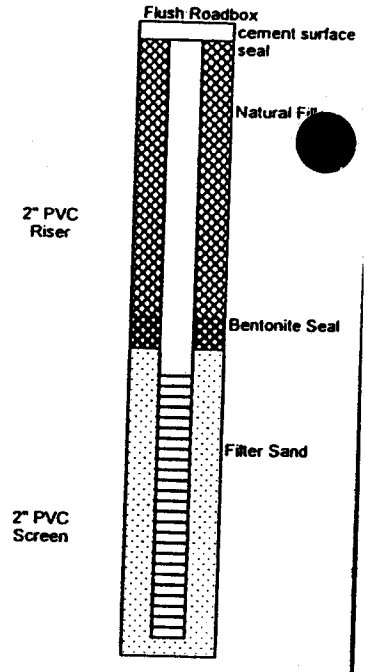
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	Core/Hand Auger
SAMPLER METHOD:	Hand Auger
CASING DIAMETER:	NA

WELL/BORING NO.:	SB-2
WEATHER:	
ATC INSPECTOR:	S.Low
SURFACE ELEVATION:	Platform
DEPTH TO WATER:	NA
ATC Project Number:	60.04694.004
Task Number:	1

Sample No.	Recovery/ Penetration (in/in)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-2	NA	NA	8.2	1		Concrete
				2		Grey, dense, SILT and CLAY, some GRAVEL, trace black material, mois
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PLASTIC SOILS COHESIVE DENSITY

0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

LEGEND:

ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

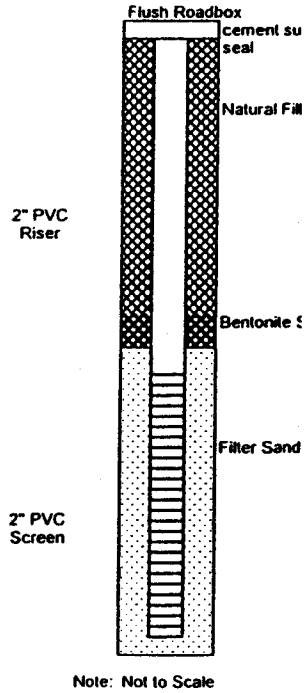
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	GeoProbe
SAMPLER METHOD:	4' stainless sampler with liners
CASING DIAMETER:	2"

WELL/BORING NO.:	SB-3
WEATHER:	
ATC INSPECTOR:	S.Low
SURFACE ELEVATION:	Street
DEPTH TO WATER:	NA
ATC Project Number:	60.0469
Task Number:	1

Sample No.	Recovery/ Penetration (in/in)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-3	24/24	NA	0.1	1–2		Brown, medium dense, fine to medium SAND, trace ORGANICS, trace FILL, dry.
				3–30		end of boring at 2'

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

PLASTIC SOILS COHESIVE DENSITY

0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

LEGEND:

ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

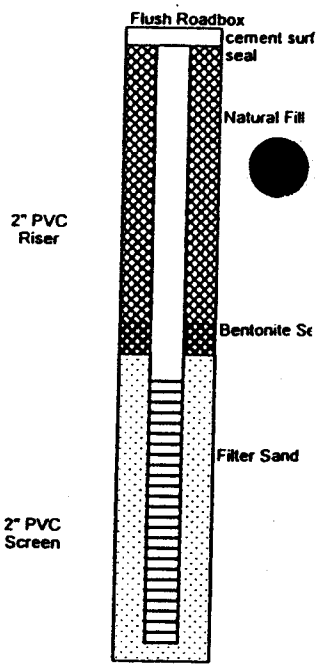
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	GeoProbe
SAMPLER METHOD:	4' stainless sampler with liners
CASING DIAMETER:	2"

WELL/BORING NO.:	S
WEATHER:	
ATC INSPECTOR:	S.Low
SURFACE ELEVATION:	Street
DEPTH TO WATER:	NA
ATC Project Number:	60.04694
Task Number:	1

Sample No.	Recovery/ Penetration (In/In)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-4 (0-4')	24/48	NA	0.1	1-4		Light brown, loose, medium SAND, dry
SB-4 (4-8')	24/48	NA	0.4	5-8		Light brown, medium dense, medium SAND, trace GRAVEL, dry
				9-30		End of boring at 8'

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

PLASTIC SOILS COHESIVE DENSITY

0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

LEGEND:

ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

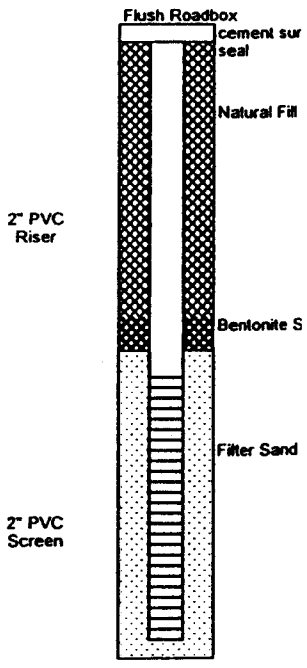
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	Gore/Hand Auger
SAMPLER METHOD:	Hand Auger
CASING DIAMETER:	NA

WELL/BORING NO.:	SB-5
WEATHER:	
ATC INSPECTOR:	S.Low
SURFACE ELEVATION:	Platform
DEPTH TO WATER:	NA
ATC Project Number:	60.04694
Task Number:	1

Sample No.	Recovery/ Penetration (in/in)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-5	NA	NA	0	1		Concrete Light brown, loose, medium SAND, trace asphalt, dry
				2		
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

PLASTIC SOILS COHESIVE DENSITY

0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

LEGEND:

ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

WELL CONSTRUCTION RECORD

ATC Associates, Inc.
600 West Cummings Park, Suite 6500
Woburn, MA 01801
Phone: (781) 932-9400 Fax: (781) 932-6211

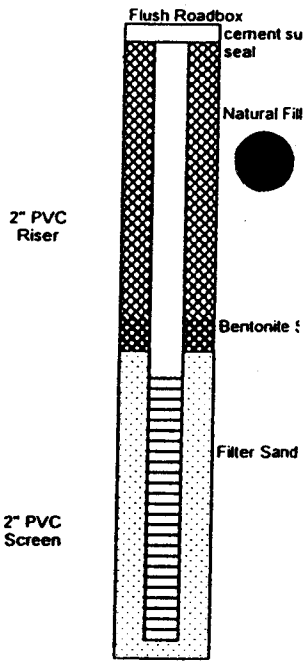
SITE:	Maverick Station
DATE:	5/16/03
CLIENT:	DMJM+HARRIS
DRILLING CO.:	Soil Ex
DRILLING METHOD:	Core/Hand Auger
SAMPLER METHOD:	Hand Auger
CASING DIAMETER:	NA

WELL/BORING NO.:	S
WEATHER:	
ATC INSPECTOR:	S Low
SURFACE ELEVATION:	Platform
DEPTH TO WATER:	NA
ATC Project Number:	60 04694
Task Number:	1

Sample No.	Recovery/ Penetration (in/in)	Blow Counts (per 6")	Headspace (ppm)	Depth (feet)	Soil Log	Materials Description (color, density, size, major and minor constituents, moisture)
SB-6	NA	NA	0.1	1		Concrete Light brown, loose, medium SAND, dry
				2		
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

Well Construction

CEMENT SEAL:	NA
NATURAL FILL	NA
BENTONITE SEAL	NA
FILTER SAND	NA
SOLID PVC RISER	NA
PVC SCREEN	NA



Note: Not to Scale

COMMENTS:

GRANULAR SOILS COHESIVELESS DENSITY

0-4	Very Loose
5-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

PROPORTIONS USED

Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

PLASTIC SOILS COHESIVE DENSITY

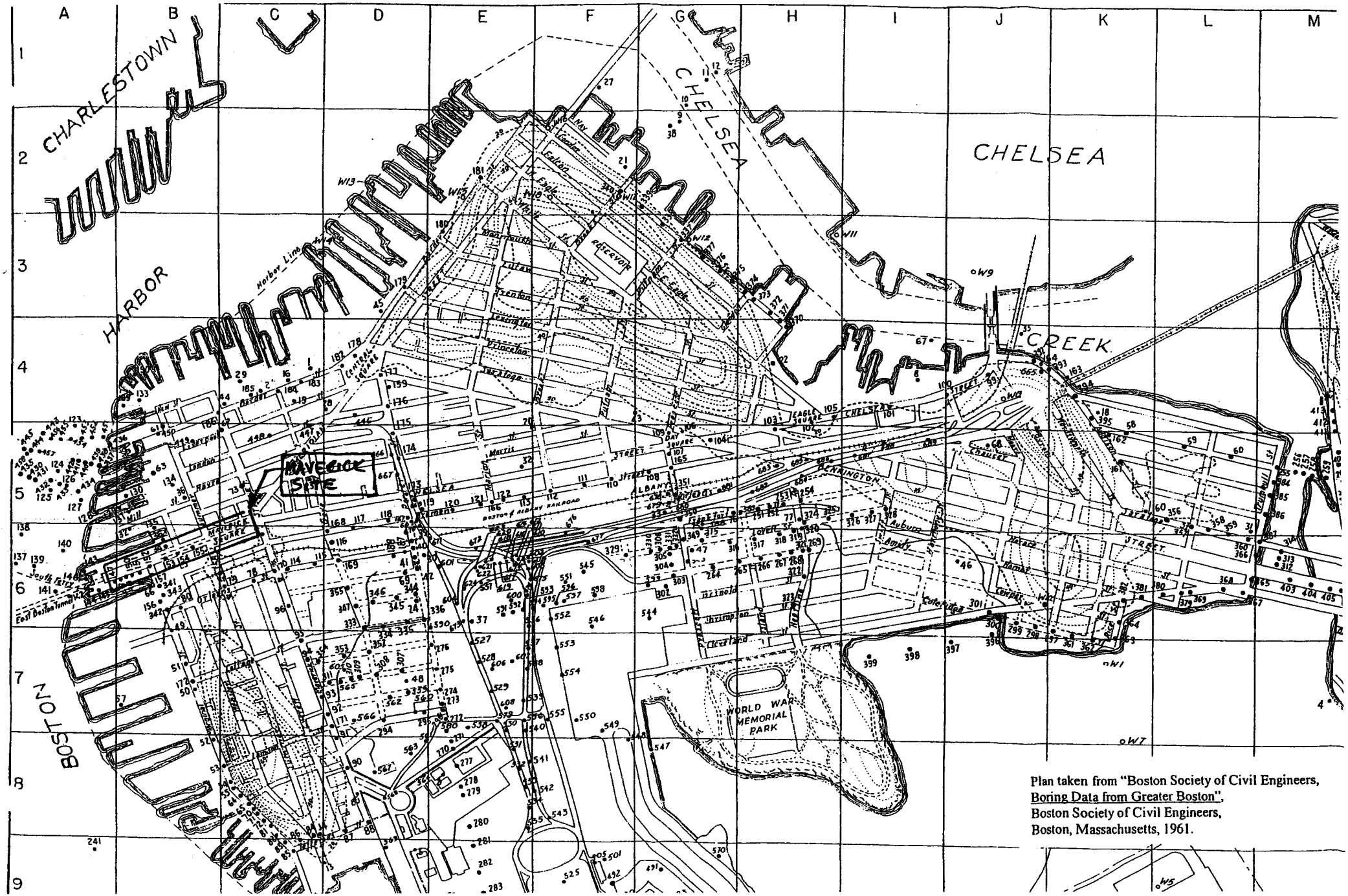
0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
31+	Hard

LEGEND:

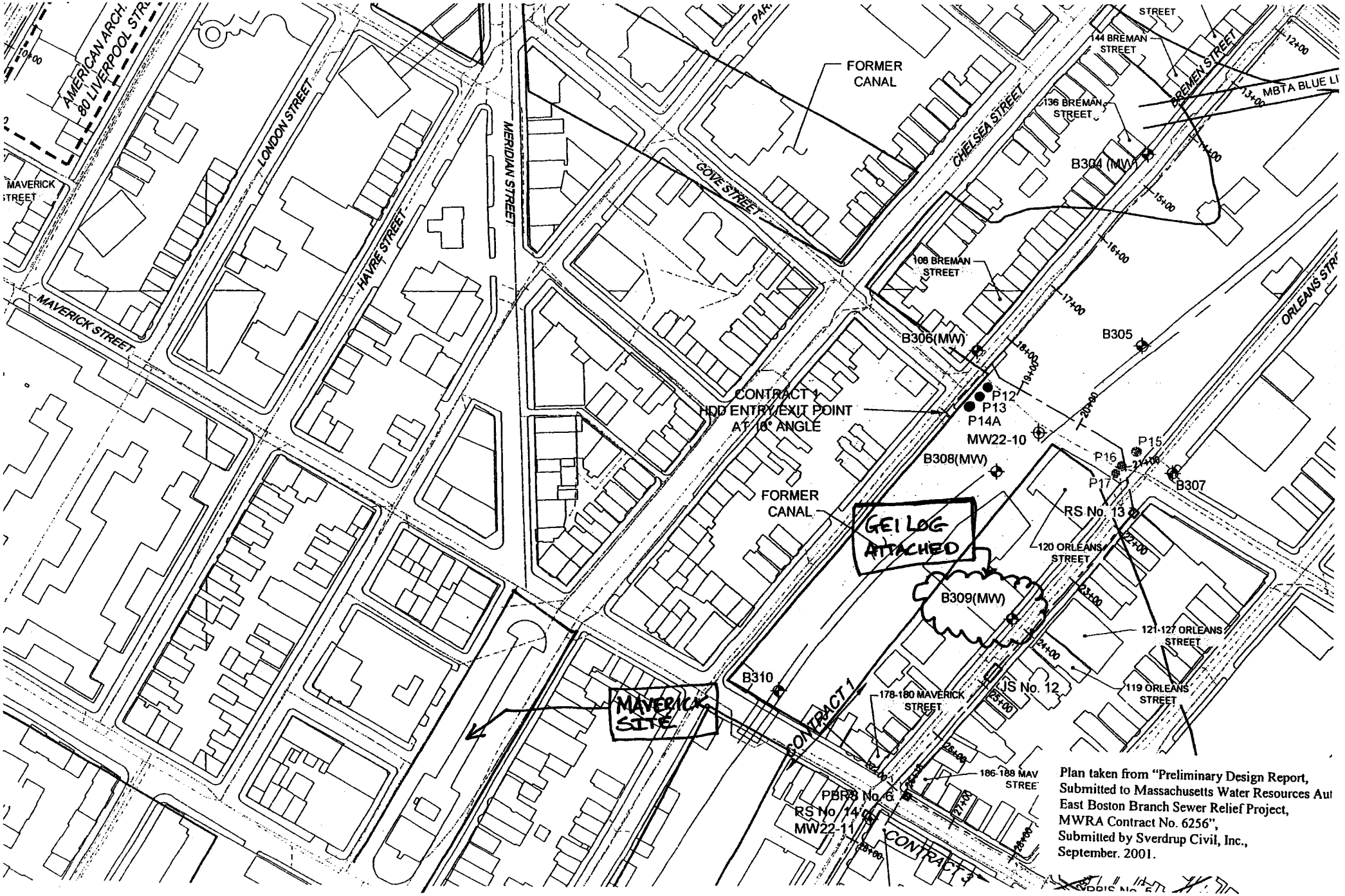
ND =	Not Detected
NA =	Not Applicable
GS =	Ground Surface

Appendix B: Information By Others

2. Boring logs compiled by the Boston Society of Civil Engineers.



Plan taken from "Boston Society of Civil Engineers, Boring Data from Greater Boston", Boston Society of Civil Engineers, Boston, Massachusetts, 1961.



Plan taken from "Preliminary Design Report, Submitted to Massachusetts Water Resources Aut East Boston Branch Sewer Relief Project, MWRA Contract No. 6256", Submitted by Sverdrup Civil, Inc., September. 2001.

Boring Data—East Boston

No. and location	Elevations or depths From	To	Formation
1 C4	Sidewalk	7.5	Fill; cinders, sand, wood
	7.5	12.0	Clay and gravel fill
	12.0	15.0	Silty sand
	15.0	17.0	Fine sand
	17.0	20.5	Sharp sand, little gravel
	20.5	22.5	Soft blue clay, sand
	22.5	27.0	Stiff blue clay
2 C4	Surface	8.0	Cinder fill.
	8.0	16.0	Fill; sand, gravel, clay
	16.0	21.3	Soft silty sand
	21.3	28.0	Hard yellow clay
3 E8	Surface	2	Ash fill
	2	21	Blue clay fill
	21	27	Sand, little gravel, fill
	27	33	Coarse sand
	33	45	Medium blue clay
4 M7	Surface	2.5	Soft mud
	2.5	13.0	Medium yellow clay
	13.0	40.0	Soft blue clay
5 D9	Surface	9	Fill; sand, gravel boulder
	9	16	Sand fill
	16	22	Silty sand, shells
	22	25	Hard yellow clay
6 P7	+12.5	+11.0	Sandy loam
	+11.0	− 5.0	Clay, gravel, sand
7 Q7	+12.0	+ 8.0	Peat
	+ 8.0	− 0.5	Yellow clay, sand
	− 0.5	− 4.5	Blue clay
8 I4	Surface	6	Ash and sand fill
	6	30	Clay fill, some mud and ashes
	30	46	Hard yellow clay
9 G2	− 5	−12	Silt
	−12	−39	Fine silty sand
	−39	−52	Hard sand, clay, gravel
10 G1	−15	−19	Silt
	−19	−35	Fine silty sand
	−35	−49	Sand, fine gravel
11 G1	−15	−22	Silt
	−22	−27	Sand, clay
	−27	−31	Sand
	−31	−51	Hard sand, clay, gravel
12 G1	0	− 5	Silty sand
	− 5	−23	Sand, clay, gravel
	−23	−27	Sand
	−27	−54	Sand, clay, gravel, hard
13 D9	Harbor bottom	3	Dock mud
	3	50	Medium blue clay
14 C8	Surface	6.5	Fill
	6.5	11.5	Mud
	11.5	25.0	Hard clay and stones, mixed
16 C4	River bed	15	Mud
	15	40	Fine sand
	40	47	Gravel
18 K4	Surface	13	Soft mud
	13	16	Coarse sand, clay
	16	43	Clay, little sand
	43	51	Soft clay
19 C4	Surface	9	Fill
	9	13	Mud
	13	18	Coarse sand
	18	30	Hard blue clay
20 E5	Cellar bottom	14	Peat mud
	14	30	Hard clay
21 F2	Surface	8	Clay fill
	8	19	Fine silty sand, mud
	19	46	Fine sand
22 H4	Surface	12.5	Fill
	12.5	17.5	Fine silty sand, mud
	17.5	21.0	Blue clay
	21.0	25.0	Yellow clay
	25.0	32.0	Clay, sand, gravel
23 C5	Surface	12.3	Fill, traces of mud
	12.3	20.0	Medium blue clay, little fine sand
	20.0	35.0	Hard yellow clay
24 D6	Surface	16.0	Fill
	16.0	18.5	Mud
	18.5	24.3	Sand, gravel
	24.3	40.0	Medium hard blue clay
25 O6	Surface	2.6	Fill
	2.6	9.0	Rocks
	9.0	20.6	Hardpan, clay, stones
27 F1	River bottom	8	Mud
	8	18	Sand
	18	48	Soft clay
	48	55	Hardpan
28 D4	Surface	14	Fill, mud
	14	19	Sand, gravel
	19	26	Blue clay
29 C4	Surface	11	Soft fill
	11	15	Soft sand
	15	25	Medium hard blue clay

No. and location	Elevations or depths From	To	Formation
30 D6	Surface	9.5	Fill, mud
	9.5	12.5	Fine sand, very soft clay
	12.5	17.0	Yellow clay
	17.0	30.0	Blue clay
31 L5	Surface	5	Fill
	5	16	Mud
	16	32	Clay and fine sand mixed
32 E5	Surface	9	Peat mud
	9	25	Loose sand
	25	29	Soft clay mixed with little sand
33 G5	Surface	8	Peat mud
	8	30	Fine sand, clay
	30	55	Soft blue clay
34 B6	Bottom harbor	8	Sand, little clay
	8	15	Clay, sand streaks
	15	38	Tough blue clay
35 J4	River bed	20	Mud
	20	26	Sand, stones, clay—hardpan
36 B5	Bottom of test pit	7	Clay
	7	10	Sand, mud, stones
	10	28	Hard blue clay
37 E6		100	Ends in clay—no rock
38 G2	+ 2	− 4	Silt
	− 4	−39	Fine silty sand
	−39	−41	Sand, clay, gravel
39 D6	+13.5	+ 9	Fill; sand, gravel, ash
	+ 9	+ 2	Silt, sand, shells
	+ 2	− 4	Fine, sand, fine gravel
	− 4	−11	Soft blue clay, fine sand
	−11	−14	Soft blue clay
	−14	−18.5	Stiff blue clay
40 D6	+ 8.0	+ 2.5	Black silt, gravel
	+ 2.5	− 6.5	Medium sand
	− 6.5	−12.0	Blue clay, fine sand
41 D6	+ 6.0	− 0.5	Black silt, sand
	− 0.5	− 6.0	Medium sand
	− 6.0	−10.0	Blue clay, fine sand
42 D6	+ 5.5	+ 3.5	Black silt
	+ 3.5	− 1.5	Medium sand
	− 1.5	−12.5	Soft blue clay, fine sand
	−12.5	−16.5	Blue clay
43 G4	Surface	4.0	Fill; brick, cinders, rubbish.
	4.0	16.5	Medium yellow clay
	16.5	21.6	Soft blue clay
	21.6	24.5	Hard sand, gravel and clay
44 C4	Surface	10	Fill
	10	20	Fine silty sand, mud
	20	35	Medium blue clay
45 D3	Surface	6	Hard packed sand and gravel
	6	21	Fine compact sand
	21	25	Hard packed gravel
46 J6	Surface	7.0	Clay and gravel fill
	7.0	10.7	Flat mud
	10.7	20.0	Medium yellow clay
	20.0	26.0	Medium blue clay
47 G6	+14.5	+ 7.0	Rubbish fill
	+ 7.0	−11.9	Very soft peat (very wet)
	−11.9	−18.0	Sharp, fine, loose sand
	−18.0	−24.0	Medium blue clay, fine sand
48 D7	2 ft. above Gove St.	14.7	Fill
	14.7	19.6	Soft silty sand
	19.6	25.0	Firm, coarse, dirty sand
	25.0	32.0	Medium blue clay
49 B7	+15	+ 6	Sand, gravel
	+ 6	− 5	Sand, gravel, clay
50 B7	+18	+ 1	Soft sand, gravel, clay
51 B7	+17	+ 7	Gravel, clay
	+ 7	− 1	Fine sand
	− 1	− 5	Clay, sand
52 B8	+19	+14	Gravel
	+14	+ 1	Sand, gravel, clay
	+ 1	− 5	Clay
53 C8	+18	+ 6	Sand, gravel
	+ 6	+ 1	Sand, gravel, clay
54 C8	+18	+ 3	Sand, gravel
	+ 3	− 5	Sand, gravel, clay
55 C8	+18	+ 8	Sand, gravel
	+ 8	+ 1	Sand, clay, very little mud mixed
	+ 1	− 3	Fine clayey sand
	− 3	− 4	Clay
56 N6	+13.0	+10.0	Sand and gravel fill
	+10.0	+ 4.5	Clay, sand, gravel
	+ 4.5	0	Silt, peat
	0	− 3.0	Sand
57 B7	0	−100	No rock
58 K5	+ 9.0	− 4.0	Peat
	− 4.0	−20.5	Soft clay, sand
	−20.5	−25.0	Fine sand, very little gravel
59 L5	+ 8.5	+ 0.5	Silty peat
	+ 0.5	− 3.5	Blue clay
	− 3.5	−11.5	Fine sand, little clay

No. and location	Elevations or depths From	To	Formation
60	+ 8.5	+ 3.0	Peat
L5	+ 3.0	− 7.5	Silt, shells
	− 7.5	−13.5	Stiff blue clay
61	+19	+ 5	Sand, gravel
B5	+ 5	−12	Gravel, some clay
	−12	−48	Stiff clay, sand, gravel
62	+20	+ 4	Yellow clay, gravel
C5	+ 4	−24	Stiff clay, sand, gravel
63	+14	− 2	Mud
B5	− 2	−59	Medium clay
	−59	−64	Stiff blue clay, some gravel
64	+17	+13	Fill; sand, gravel, broken stone
C8	+13	+ 4	Fine sand
	+ 4	− 2	Sand, gravel, clay (till)
			Rock about −2
65	Surface	12	Sand, gravel
C8	12	13	Fine sand
	13	16	Sand, gravel, clay (till)
			Rock
66	Surface	21	Fine clayey gravel
B6			mixed with mud
	21	23	Gravel, clay, little sand
67	Surface	24	Clay, sand
I4	24	40	Sand
	40	46	Hardpan
68	Surface	10	Sand
J5	10	28	Fine sand mixed with little clay
	28	30	Hard gravel, stones
			No ledge
69	+15	+ 3	Fill
D6	+ 3	− 3	Silt, peat
	− 3	− 8	Coarse sand
	− 8	−13	Blue clay, sand
70	Surface	4	Fill, sand, gravel, clay
C8	4	14	Sand, clay
	14	16	Sand, gravel, clay (till)
			Rock
71	Surface	2	Gravel
C8	2	15	Sand, gravel, clay, (till)
			Rock
72	Surface	5	Sand, gravel
C8	5	13	Fine sand
	13	15	Sand, gravel, clay (till)
			Rock
73	+19	+15	Mud
C5	+15	− 2	Yellow clay, gravel
	− 2	−40	Hard clay and gravel
75	+14.0	+ 8.5	Fill; clay, sand, gravel
G5	+ 8.5	+ 2.0	Stiff brown peat
	+ 2.0	− 3.0	Stiff blue clay, sand
76	+12.5	+ 7.5	Clay, sand, gravel
G5	+ 7.5	+ 2.5	Stiff brown peat
	+ 2.5	− 4.5	Coarse sand, fine gravel
77	+17	+ 8	Sand, gravel and fill
H5	+ 8	+ 2	Silt
	+ 2	0	Peat
	0	− 5	Blue clay (hard)
78	+15	+ 7	Sand, gravel
C6	+ 7	− 3	Sand, clay
79	+16	+ 8	Sand, gravel
C6	+ 8	− 2	Gravel, sand, clay
80	+16	+ 6	Clay, gravel
B6	+ 6	0	Silt
	0	− 4	Sand, clay
81	Surface	6	Sand, gravel
C8	6	15	Fine sand
			Rock
82	Surface	5	Sand, gravel
C8	5	10	Fine sand
	10	13	Sand, gravel, clay (till)
			Rock
83	Surface		
C9	about 17	13	Sand, gravel
	13	5	Fine sand
	5	3	Sand, gravel, clay (till)
	3		Rock about 3
84	+20	+12.7	Sand, gravel, clay (till)
C8	+12.7		Rock at about 13
85	Surface	7.4	Coarse gravel
C9	7.4	9.5	Sand, gravel, clay (till)
			Rock
86	+25	+ 9	Sand, gravel, clay
C8			
87	+20	+17	Gravel
D8	+17	+16	Fine sand
	+16	+11	Boulder
88	+17	+ 2	Clay, gravel
D8	+ 2	+ 1	Fine sand
89	+17	+12	Sand, gravel
D8	+12	+ 5	Clay, sand
	+ 5	+ 1	Coarse sand

No. and location	Elevations or depths From	To	Formation
90	+18	+11	Sand, gravel
D8	+11	+ 6	Clay, sand, peat
	+ 6	+ 1	Coarse sand
91	+16	+ 8	Sand, gravel, clay
D8	+ 8	+ 3	Clay, peat
	+ 3	0	Coarse sand
92	+16	+ 9	Sand and gravel fill
D7	+ 9	+ 6	Peat
	+ 6	+ 4	Gravel
	+ 4	0	Clay
93	+17	+12	Sand and gravel fill
D7	+12	+ 5	Sand, peat
	+ 5	+ 2	Sand
94	+16	+12	Sand and gravel fill
C7	+12	+ 3	Clay, sand
	+ 3	+ 2	Sand
95	+15	+10	Sand, gravel
C7	+10	+ 3	Peat, clay, sand
	+ 3	+ 1	Sand
96	+16	+ 7	Ash fill
C6	+ 7	− 1	Peat, silt
	− 1	− 3	Coarse sand
	− 3	− 4	Clay
97	+11	+ 8	Cinders
N6	+ 8	+ 3	Sand
	+ 3	0	Blue clay, little sand
	0	−12	Fine sand
98	+14	+10	Fill; sand, gravel, clay
N7	+10	+ 7.5	Peat
	+ 7.5	+ 4	Fine sand
	+ 4	− 4	Yellow clay, sand
	− 4	−11	Fine sand
99	+19	+ 7	Hardpan
J4	+ 7	−17	Blue hardpan, clay
100	+20	+ 4	Gravel, stones
J4	+ 4	− 7	Hard sand
101	+21	+17	Hard gravel fill
I4	+17	0	Yellow clay
	0	− 2	Sand
	− 2	−14	Blue hardpan
102	+20	+14	Yellow hardpan, gravel
H4	+14	0	Yellow clay
	0	− 3	Gravel, clay, boulders (till)
	− 3	− 9	Blue hardpan
103	+22	+12	Sand
H5	+12	+ 6	Clay
	+ 6	+ 2	Gravel
	+ 2	− 4	Clay
104	+23	+17	Yellow hardpan
G5	+17	−10	Blue hardpan
105	+20	− 4	Clay, gravel
H4			
106	+12	+11	Yellow hardpan
G5	+11	+ 8	Peat
	+ 8	−13	Hard yellow clay
	−13	−18	Blue hardpan
107	+15	+10	Hardpan, fill
G5	+10	+ 6	Peat
	+ 6	− 4	Hard yellow clay
	− 4	−15	Soft blue clay
108	+16	+13	Hardpan, fill
G5	+13	+ 7	Peat
	+ 7	− 3	Clay, small stones
	− 3	−12	Soft blue clay
108	+16	+13	Hardpan, fill
G5	+13	+ 7	Peat
	+ 7	− 3	Clay, small stones
	− 3	−12	Soft blue clay
109	+19	− 4	Clay, gravel (till)
G5			
110	+15	+ 5	Clay, gravel
F5	+ 5	− 3	Silt
	− 3	− 6	Clay, gravel
111	+16	+11	Hardpan, fill
F5	+11	+ 8	Peat
	+ 8	− 9	Sand, clay
	− 9	−13	Soft clay
112	+15	+ 5	Clay, gravel
F5	+ 5	− 1	Peat
	− 1	− 5	Clay, sand
113	+16	+11	Hardpan, fill
E5	+11	+ 8	Peat, sand
	+ 8	− 5	Sand with clay
	− 5	− 9	Sand
	− 9	−17	Fine sand
	−17	−20	Soft blue clay
114	+16	+10	Clay and gravel fill
C6	+10	+ 3	Ash fill
	+ 3	− 3	Sand
115	+16	+10	Clay and gravel fill
C6	+10	+ 3	Ash fill
	+ 3	0	Fine sand
	0	− 4	Clay, sand
116	+17	+ 5	Ash fill
D6	+ 5	+ 2	Peat
	+ 2	− 1	Fine sand
	− 1	− 5	Clay
117	+16	+11	Gravel fill
D6	+11	+ 8	Fine sand fill
	+ 8	+ 4	Peat
	+ 4	− 1	Fine sand
	− 1	− 5	Sand, clay
118	+16	+ 7	Sand and gravel fill
D5	+ 7	0	Peat
	0	− 5	Sand, clay

No. and location	Elevations or depths From	To	Formation
119 D5	+15	+ 4	Sand and gravel fill
	+ 4	+ 1	Peat
	+ 1	− 1	Sand
	− 1	− 5	Sand, clay
120 E5	+16	+ 6	Sand, gravel, clay
	+ 6	+ 4	Peat
	+ 4	− 6	Clay, silt
121 E5	+16	+ 8	Coarse sand
	+ 8	+ 4	Peat
	+ 4	+ 3	Sand, gravel
	+ 3	+ 2	Clay
	+ 2	− 3	Sand
122 E5	+16	+11	Fill; sand, gravel, clay
	+11	+ 8	Peat, sand
	+ 8	− 3	Sand, clay
	− 3	− 9	Coarse sand
123 A5	−36	−38	Sand, gravel, shells
	−38	−55	Stiff blue clay
	−55	−86	Stiff blue clay, fine sand
124 A5	−38	−42	Soft black silt
	−42	−84	Stiff blue clay
	−84	−89	Hard sand, gravel, clay
125 A5	−34	−38	Soft black silt
	−38	−47	Stiff blue clay, little sand
	−47	−83	Stiff blue clay
	−83	−85	Sand, gravel, clay, hard
126 A5	−23	−26	Soft black silt
	−26	−73	Stiff blue clay
	−73	−85	Sand, gravel, clay, hard
127 A5	−23	−26	Soft black silt
	−26	−68	Stiff blue clay, little sand
	−68	−74	Sand, little gravel, blue clay
128 A5	− 5	− 7	Black mud
	− 7	−13	Sand
	−13	−16	Sand, clay
	−16	−71	Very stiff blue clay
129 B5	−22	−25	Soft black silt
	−25	−85	Stiff blue clay
130 B5	− 2	− 5	Mud
	− 5	−10	Sand
	−10	−15	Compact sand
	−15	−17	Blue clay
	−17	−64	Stiff blue clay
	−64	−65	Fine sand
	−65	−76	Stiff blue clay
131 B5	− 2	− 5	Black mud
	− 5	− 9	Sand
	− 9	−61	Stiff blue clay
132 B6	+15	+11	Fill
	+11	+ 9	Wood
	+ 9	+ 7	Light colored mud
	+ 7	− 7	Fine sand
	− 7	−10	Blue clay
	−10	−14	Clay, stones
	−14	−48	Stiff blue clay
	−48	−49	Fine sand
133 B4	+16	+15	Paving
	+15	+12	Fill
	+12	+ 4	Sand, gravel, silt
	+ 4	− 3	Blue silty peat, roots
	− 3	− 6	Hard yellow clay, sand
	− 6	−40	Some gravel, clay
134 B5	+15	+ 4	Fill
	+ 4	− 1	Soft black silt
	− 1	− 4	Fine silty sand, clay, soft
	− 4	− 9	Soft blue clay, sand
	− 9	−36	Stiff blue clay
135 B6	+16	+ 1	Fill
	+ 1	− 3	Fine sand
	− 3	− 4	Blue clay
	− 4	− 6	Fine sand
	− 6	−40	Stiff blue clay
136 B6	+17	+ 1	Compact sand, fine gravel
	+ 1	− 3	Stiff blue clay
	− 3	− 7	Fine sand
	− 7	−34	Stiff blue clay
137 A6	−37	−38	Black silt
	−38	−78	Blue clay, stones
	−78	−92	Sand, clay, gravel
138 A6	−34	−36	Soft black silt
	−36	−70	Stiff blue clay
	−70	−84	Stiff blue clay, little sand
			No till—no rock
139 A6	−29	−32	Black silt
	−32	−79	Blue clay, stones
	−79	−84	Sand, clay, gravel
140 A6	−21	−25	Soft black silt
	−25	−64	Stiff blue clay, little sand
	−64	−72	Stiff blue clay, little sand and gravel
141 A6	−24	−28	Silt
	−28	−80	Blue clay
142 A6	−12	−14	Black silt
	−14	−68	Blue clay
143 A6	−20	−28	Black mud, fine sand
	−28	−50	Stiff blue clay
	−50	−55	Stiff blue clay, stones
	−55	−76	Stiff blue clay
144 A6	− 7	−10	Black mud, sand
	−10	−20	Fine sand
	−20	−24	Yellow clay
	−24	−74	Stiff blue clay
145 A6	+14	+ 7	Fill
	+ 7	− 5	Fine silty sand
	− 5	−11	Fine stiff sand, some gravel
	−11	−13	Fine sand
	−13	−19	Fine clayey sand
	−19	−45	Stiff blue clay
146 A6	+15	+ 5	Fill
	+ 5	− 7	Clayey gravel
	− 7	−14	Fine silty sand, shells
	−14	−59	Plastic blue clay
147 A6	+18	+11	Fill
	+11	+10	Wood
	+10	+ 4	Fill
	+ 4	− 5	Black mud, tendency to clay
	− 5	−17	Stiff blue clay
	−17	−18	Fine sand
	−18	−27	Stiff blue clay
	−27	−54	Plastic blue clay
148 B6	+18	+ 8	Fill
	+ 8	+ 2	Soft mud, fine sand
	+ 2	−17	Fine sand
	−17	−60	Stiff blue clay
149 B6	+18	+16	Fill
	+16	+ 3	Yellow clayey gravel
	+ 3	−20	Fine sand, mud
	−20	−37	Stiff blue clay
150 B6	+18	+ 6	Fill
	+ 6	0	Soft mud, sand, some clay
	0	−16	Fine sand, some mud, stones
	−16	−22	Plastic blue clay
	−22	−53	Stiff blue clay
151 B6	+18	+ 3	Fill
	+ 3	− 9	Bog mud, tendency to clay
	− 9	−22	Stiff yellow clay
	−22	−42	Plastic clay, some stones
	−42	−53	Plastic blue clay, sand, stones
152 B6	+18	+16	Fill
	+16	+ 3	Clayey gravel
	+ 3	−12	Black mud, fine sand
	−12	−34	Stiff blue clay
	−34	−42	Stiff blue clay, stones
153 B6	+18	+10	Fill
	+10	+ 1	Clayey gravel
	+ 1	− 2	Coarse sharp sand
	− 2	− 5	Fine sand
	− 5	−35	Plastic blue clay
	−35	−36	Fine sand
	−36	−39	Plastic blue clay
154 B6	+18	+11	Fill
	+11	− 8	Sandy silt
	− 8	−20	Blue clay
155 B6	+19	+15	Sand, gravel, shells
	+15	+ 2	Sand, shells, gravel, little clay
	+ 2	−15	Blue clay
	−15	−20	Clay, gravel
156 B6	+15	+11	Fill
	+11	+ 2	Soft clay, sand
	+ 2	− 4	Little peat, silty sand
	− 4	− 6	Little clay, fine sand
	− 6	−12	Little stiff clay, sand
157 B6	+15	+11	Fill
	+11	+ 3	Soft clay, sand
	+ 3	− 4	Little peat, silty sand
	− 4	− 6	Little clay, fine sand
	− 6	−12	Little stiff clay, sand
158 C6	+17	+14	Compact dry gravel
	+14	+ 6	Loose wet gravel
	+ 6	+ 5	Stone
	+ 5	0	Loose wet gravel
	0	− 1	Blue clay
159 D4	+10	+ 8	Peat, mud
	+ 8	+ 3	Sand, coarse gravel
	+ 3	− 1	Yellow clay, little gravel
	− 1	− 3	Blue clay, little fine sand
	− 3	−15	Blue clay
160 K5	+21	+12	Gravel, clay, loam, stones
	+12	+ 4	Loam
	+ 4	+ 2	Blue clay
	+ 2	− 6	Silty clay
161 K5	+18	+15	Fill
	+15	+14	Loam
	+14		Yellow clay
162 K5	+18	+16	Fill
	+16	+ 5	Hard pan
	+ 5		Hard blue clay
163 K4	+18	+12	Fill
	+12	+ 6	Hardpan
	+ 6	− 6	Hard blue clay, yellow clay
164 J4	+18	+11	Fill
	+11	+ 3	Hardpan
	+ 3	− 6	Hard blue clay
165 G5	+16	+10	Fill
	+10	+ 7	Peat
	+ 7	− 6	Blue clay
166 E5	+14	+ 6	Fill
	+ 6	+ 1	Peat
	+ 1	− 1	Clay, sand
	− 1	− 6	Wet sand

No. and location	Elevations or depths From	To	Formation
167 D5	+16	+ 6	Fill
	+ 6	+ 4	Peat
	+ 4	− 6	Wet sand
168 D6	+15	+ 8	Fill
	+ 8	+ 6	Peat
	+ 6	− 6	Blue clay
169 D6	+18	+15	Fill
	+15	+12	Shells
	+12	+ 9	Yellow clay
	+ 9	+ 6	Peat
	+ 6	− 6	Blue clay
170 C6	+16	+ 7	Fill
	+ 7	+ 3	Peat
	+ 3	− 6	Sandy clay
171 D7	+12	+ 5	Fill
	+ 5	+ 3	Peat
	+ 3	− 1	Sand
	− 1	− 6	Blue clay
172 B7	+18	+12	Fill
	+12	− 4	Gravel, clay
173 D5	+15	+ 5	Fill
	+ 5	+ 1	Peat
	+ 1	− 1	Coarse sand
	− 1	− 6	Sand
174 D5	+15	+10	Fill
	+10	+ 4	Peat
	+ 4	+ 2	Coarse sand
	+ 2	− 4	Sand
175 D5	+15	+10	Fill
	+10	+ 5	Peat
	+ 5	+ 2.5	Coarse sand
	+ 2.5	− 4	Sand
176 D4	+14.0	+ 9.5	Fill
	+ 9.5	+ 4.0	Peat
	+ 4.0	+ 1.5	Coarse sand
	+ 1.5	− 4.0	Sand
177 D4	+16	+11	Fill
	+11	+ 7	Peat
	+ 7	− 4	Gravel, clay
178 D4	+16.5	+ 4	Fill
	+ 4	+ 3	Peat
	+ 3	0	Blue clay
	0	− 4	Sand, gravel
179 D3	+16	+ 7	Fill
	+ 7	− 4	Clay, gravel
180 E3	+17	+11	Fill
	+11	− 4	Gravel, sand
181 E2	+29	+18	Hardpan
	+18	− 4	Clay, gravel
182 D4	+16	+ 9	Fill
	+ 9	+ 1	Peat
	+ 1	− 4	Coarse sand
183 C4	+19.0	+ 8.5	Fill
	+ 8.5	+ 5.0	Peat
	+ 5.0	[illegible]0	Coarse sand

No. and location	Elevations or depths From	To	Formation
184 C4	+19	+ 5	Fill
	+ 5	− 4	Coarse sand
185 C4	+19	+11	Fill
	+11	+ 9	Coarse sand
	+ 9	− 4	Fine sand
186 B4	+18.0	+14.0	Fill
	+14.0	+12.5	Peat
	+12.5	− 4.0	Blue clay
187 D6	Surface	− 6.0	Fill
	− 6.0	−10.5	Clay, sand, gravel
	−10.5	−14.0	Black silt
	−14.0	−23.5	Coarse sand, little gravel
	−23.5	−25.5	Blue clay, little fine sand
	−25.5	−36.0	Medium stiff blue clay
188 D6	Surface	−13	Fill
	−13	−20	Little clay, fine sand
	−20	−22	Clay, little sand
	−22	−34	Medium stiff blue clay
189 B4	Surface	− 5.0	Fill
	− 5.0	−13.5	Peat
	−13.5	−20.0	Silty sand
	−20.0	−68.0	Stiff blue clay
190 B4	Surface	−11	Yellow clay—gravel
	−11	−34	Sand, little gravel and clay
241 A9	Surface		
	−18	−24	Silt
	−24	−31	Hard blue clay
	−31	−46	Stiff blue clay
242 B9	−14	−20	Silt
	−20	−28	Hard blue clay
	−28	−34	Stiff blue clay
	−34	−42	Soft blue clay
243 B10	−14	−16	Silt
	−16	−21	Hard blue clay
	−21	−41	Stiff blue clay
244 B10	−14	−18	Silt
	−18	−29	Hard blue clay
	−29	−41	Stiff blue clay
245 B11	−15	−16	Silt
	−16	−17	Silty sand, clay
	−17	−27	Hard blue clay
	−27	−41	Stiff blue clay
246 B11	−11	−14	Silt
	−14	−15	Silty sand, clay
	−15	−26	Hard blue clay
	−26	−39	Stiff blue clay
247 C12	−14	−20	Silt
	−20	−41	Stiff blue clay
248 C12	−15	−19	Silt
	−19	−28	Hard blue clay
	−28	−41	Stiff blue clay

No. and location	Elevations or depths From	To	Formation
249 C13	−14	−18	Gravel, silt
	−18	−23	Hard blue clay
	−23	−41	Stiff blue clay
250 C13	−18	−24	Silt
	−24	−31	Hard blue clay
	−31	−46	Stiff blue clay
251 H5	+12.0	+ 7.0	Fill; clay, sand, gravel
	+ 7.0	+ 2.0	Silt, sand
	+ 2.0	− 0.5	Stiff brown peat
	− 0.5	− 5.0	Coarse sand, gravel
252 H5	+13.5	+ 9.5	Fill; clay, sand, gravel
	+ 9.5	+ 4.0	Stiff brown peat
	+ 4.0	− 3.5	Coarse sand, fine gravel
253 H5	+14.5	+10.0	Clay, sand, gravel
	+10.0	+ 4.5	Stiff brown peat
	+ 4.5	− 2.5	Stiff blue clay, sand
254 H5	+16.0	+ 8.5	Sand and gravel fill
	+ 8.5	+ 3.5	Silt, peat
	+ 3.5	− 0.5	Blue clay, sand
255 M5	+ 8.5	+ 5.0	Peat
	+ 5.0	− 1.5	Silty sand, shells
	− 1.5	− 4.0	Soft blue clay, sand
	− 4.0	−10.0	Stiff blue clay
256 M5	− 5.5	− 7.0	Silt
	− 7.0	−11.0	Silty sand
	−11.0	−15.0	Clay, sand
257 M5	− 6.5	− 8.5	Silt
	− 8.5	−10.0	Sand
	−10.0	−15.0	Sand, clay
258 M5	− 4.0	− 5.0	Silt
	− 5.0	− 6.5	Silty sand
	− 6.5	− 7.5	Blue clay, sand
	− 7.5	−15.0	Fine sand, little gravel
259 M5	+ 9.0	− 2.5	Peat
	− 2.5	− 5.0	Silty sand, peat
	− 5.0	−11.0	Blue clay, sand
260 M5	+10.5	+ 4.5	Clay and gravel fill
	+ 4.5	+ 3.0	Peat
	+ 3.0	− 6.5	Silty peat
	− 6.5	− 9.5	Soft blue clay
	− 9.5	−14.5	Fine sand, little clay
261 M6	+14.5	+ 6.5	Fill; clay, gravel, sand
	+ 6.5	− 5.0	Stiff yellow clay, sand
	− 5.0	−10.0	Stiff blue clay

No. and location	Elevations or depths From	To	Formation
262 M5	+13.0	+ 8.5	Fill; clay, gravel, sand
	+ 8.5	+ 3.0	Silty peat
	+ 3.0	− 1.0	Silty sand
	− 1.0	−10.0	Blue clay, sand
263 N6	+16.0	+ 9.5	Fill; clay, gravel, sand
	+ 9.5	− 9.5	Sand, gravel, small stones
264 G6	+17	+ 7	Clay, sand, gravel
	+ 7	+ 1	Stiff brown peat
	+ 1	− 3	Sharp sand, gravel
265 H6	+17.0	+ 8.5	Fill; clay, sand, gravel
	+ 8.5	+ 2.0	Stiff brown peat
	+ 2.0	− 2.0	Coarse sand, gravel
266 H6	+16.5	+10.0	Fill; clay, sand, gravel
	+10.0	+ 4.0	Stiff brown peat
	+ 4.0	− 0.5	Coarse sand, gravel
267 H6	+17.0	+ 9.5	Fill; clay, sand, gravel
	+ 9.5	+ 3.0	Stiff brown peat
	+ 3.0	+ 1.2	Silt, sand
	+ 1.2	− 2.0	Coarse sand, gravel
268 H6	+16.5	+ 9.0	Fill; clay, sand, gravel
	+ 9.0	+ 7.0	Stiff brown peat
	+ 7.0	+ 0.3	Silt, sand
	+ 0.3	− 3.5	Coarse sand, gravel
269 H6	+16.0	+ 6.5	Clay, sand, gravel
	+ 6.5	+ 0.5	Stiff brown peat
	+ 0.5	− 4.0	Coarse sand, fine gravel
270 E8	+13.0	+ 3.0	Fill
	+ 3.0	− 2.0	Soft silt
	− 2.0	− 5.3	Fine sand
	− 5.3	− 8.0	Coarse sand, gravel
	− 8.0	−12.0	Medium blue clay
271 E8	+12.0	+ 0.5	Fill
	+ 0.5	− 3.5	Silt
	− 3.5	− 9.5	Fine sand
	− 9.5	−17.0	Medium blue clay
272 E7	+10.5	+ 0.5	Fill
	+ 0.5	− 5.0	Fine sand
	− 5.0	−12.0	Medium blue clay
273 E7	+12.0	+ 2.0	Fill
	+ 2.0	− 1.2	Silt
	− 1.2	− 5.5	Fine sand, little fine gravel
	− 5.5	− 8.0	Hard blue clay
274 E7	+19.5	+ 5.0	Fill
	+ 5.0	+ 2.0	Soft silt
	+ 2.0	+ 0.7	Silty sand, shells
	+ 0.7	− 1.0	Medium sa[illegible]
	− 1.0	− 5.5	Little fine [illegible]

No. and location	Elevations or depths From	To	Formation
275 E7	+16.0	+ 3.0	Fill
	+ 3.0	− 1.5	Dirty sand
	− 1.5	− 4.0	Medium blue clay (wet)
	− 4.0	−15.0	Medium blue clay
276 E7	+16.0	+ 3.0	Fill
	+ 3.0	− 0.5	Soft silt, peat
	− 0.5	− 2.5	Medium dirty sand
	− 2.5	− 4.5	Coarse sand, little fine gravel
	− 4.5	− 6.5	Clay, sand, little gravel
	− 6.5	−19.0	Medium blue clay
277 E8	+14.5	+ 1.0	Clay fill
	+ 1.0	− 1.5	Soft silt
	− 1.5	− 8.7	Coarse sand
	− 8.7	−14.5	Medium blue clay
278 E8	+17.0	+ 1.5	Sand fill
	+ 1.5	− 1.0	Soft silt
	− 1.0	− 3.0	Dirty sand
	− 3.0	− 5.0	Fine sand
	− 5.0	− 8.0	Medium blue clay
279 E8	+15.5	+ 2.0	Fill
	+ 2.0	− 1.7	Silty sand
	− 1.7	− 6.2	Medium sand
	− 6.2	− 9.5	Medium blue clay
280 E8	+19.5	+ 1.5	Fill
	+ 1.5	− 1.2	Soft silt
	− 1.2	− 6.7	Coarse sand
	− 6.7	−12	Medium blue clay
281 E9	+18.0	+ 1.5	Sand and clay fill
	+ 1.5	− 1.2	Soft silt
	− 1.2	− 3.5	Loose coarse sand
	− 3.5	− 9.0	Hard yellow clay
282 E9	+17.5	+ 1.5	Fill
	+ 1.5	− 2.0	Soft silt
	− 2.0	− 3.0	Dirty sand
	− 3.0	−10.5	Medium yellow clay
283 E9	+17.0	+ 7.0	Clay fill
	+ 7.0	− 1.0	Sand fill
	− 1.0	− 2.5	Silt
	− 2.5	− 5.0	Dirty sand
	− 5.0	− 7.5	Hard yellow clay
284 E5	+ 8.5	+ 0.5	Silty peat
	+ 0.5	− 1.5	Silty sand
	− 1.5	− 8.0	Stiff blue clay
	− 8.0	− 9.5	Very stiff blue clay
285 E5	+ 8.0	+ 0.5	Silty peat
	+ 0.5	− 3.0	Sand, little gravel
	− 3.0	−11.0	Soft blue clay, fine sand
	−11.0	−13.0	Stiff blue clay
286 E5	+ 8.0	+ 0.5	Silty peat
	+ 0.5	− 7.0	Sand, little silt
	− 7.0	−11.0	Soft blue clay, very fine sand
	−11.0	−18.0	Stiff blue clay
287 O7	+12.0	+ 6.0	Fill; cinders, gravel, sand
	+ 6.0	+ 2.0	Peat
	+ 2.0	− 1.0	Fine sand
	− 1.0	− 3.0	Sand, gravel
	− 3.0	− 5.5	Blue clay, sand
	− 5.5	− 9.0	Fine sand
	− 9.0	−10.0	Blue clay
288 O7	+14.0	+10.0	Fill; sand, gravel, clay
	+10.0	+ 7.5	Peat
	+ 7.5	+ 4.0	Fine sand
	+ 4.0	− 4.0	Yellow clay, sand
	− 4.0	−11.0	Fine sand
289 O7	+10.0	− 5.0	Fill; sand, gravel, clay
	− 5.0	− 8.2	Peat
	− 8.2	−11.0	Coarse sand, gravel
	−11.0	−17.0	Yellow clay, gravel
290 P7	+10.5	+ 7.5	Peat
	+ 7.5	− 1.5	Coarse sand
	− 1.5	− 5.5	Coarse sand, gravel
291 P7	+10.5	− 1.5	Peat, mud
	− 1.5	− 6.0	Sand, gravel
292 P7	+12.0	+ 4.0	Peat, mud
	+ 4.0	− 4.5	Stiff yellow clay
293 P7	+12.0	+ 6.0	Peat, mud
	+ 6.0	+ 2.0	Sand, gravel
	+ 2.0	− 4.5	Clay
294 D7	+16.0	+ 5.0	Fill
	+ 5.0	+ 1.5	Silt, fine sand
	+ 1.5	+ 0.5	Sand, gravel
	+ 0.5	− 5.0	Hard yellow clay
295 D7	+11.0	+ 3.0	Fill
	+ 3.0	− 2.0	Silt, fine sand
	− 2.0	− 3.7	Sand, gravel
	− 3.7	− 9.0	Hard yellow clay
296 E7	+11.0	+ 3.5	Sand and gravel fill
	+ 3.5	− 2.0	Silt, fine gravel
	− 2.0	− 4.0	Sand, gravel
	− 4.0	− 9.0	Hard blue clay
297 K6	+21.0	+20.2	Roadbed
	+20.2	+13.5	Sand and gravel fill
	+13.5	− 4.0	Yellow clay, gravel, sand
298 J6	+19.5	+18.5	Roadbed
	+18.5	+12.0	Sand and gravel fill
	+12.0	+ 4.0	Gravel, sand
	+ 4.0	− 6.0	Blue clay, gravel, sand
299 J6	+10.0	+ 4.0	Sand and gravel fill
	+ 4.0	− 6.0	Yellow clay, gravel, sand
	− 6.0	−12.0	Blue clay, gravel, sand

No. and location	Elevations or depths From	To	Formation
300 J6	+ 3	− 7	Sand and gravel fill
	− 7	−12	Yellow clay, sand
	−12	−15	Yellow clay, sand, gravel
301 J6	+10.5	+ 5.5	Silt, sand
	+ 5.5	+ 4.0	Yellow clay, gravel, sand
302 G6	+16.0	+ 2.0	Fill
	+ 2.0	−13.5	Fine sand, little clay
	−13.5	−23.0	Medium blue clay
303 G6	+15.0	+ 7.0	Fill
	+ 7.0	+ 2.0	Peat
	+ 2.0	− 3.5	Medium sand, little gravel
	− 3.5	−13.0	Medium blue clay, little fine sand
304 G6	+15.0	+10.0	Fill
	+10.0	+ 1.5	Peat
	+ 1.5	− 5.0	Fine sand, little clay
	− 5.0	−15.0	Medium blue clay, little sand
305 G6	+ 8.5	+ 1.5	Peat
	+ 1.5	−16.5	Fine sand, little clay
306 G6	+11.5	+ 4.2	Mud, silt
	+ 4.2	+ 1.2	Sand, mud
	+ 1.2	− 4.5	Blue clay
307 D7	+14.5	+ 2.5	Fill; sand, gravel, ash
	+ 2.5	− 1.5	Soft silt
	− 1.5	− 4.5	Coarse sand (loose)
	− 4.5	− 6.0	Stiff blue clay
308 D7	+15.0	+ 3.5	Ash fill
	+ 3.5	0	Soft silt
	0	− 2.5	Coarse sand (fairly hard)
309 D7	+15.5	+ 3.0	Ash fill
	+ 3.0	+ 1.0	Soft silt
	+ 1.0	− 4.5	Coarse sand
310 D7	+17	+ 3	Fill; sand, gravel, ashes
	+ 3	+ 1	Sand and gravel, hard
311 D7	+16.5	+ 8.0	Ash fill
	+ 8.0	+ 6.0	Soft peat
	+ 6.0	+ 2.5	Sand, gravel
312 M6	+ 1.5	− 0.5	Silty sand, gravel
	− 0.5	− 2.5	Fine sand, little clay
	− 2.5	− 7.5	Blue clay, soft
	− 7.5	−10.5	Fine sand, blue clay
313 M6	0	− 3.5	Silty mud
	− 3.5	− 9.5	Sand, clay
	− 9.5	−16.5	Fine sand, clay
	−16.5	−22.5	Soft blue clay
	−22.5	−26.0	Stiff blue clay
314 M6	+ 4.0	− 2.5	Silt
	− 2.5	− 7.5	Sand, clay
	− 7.5	−13.5	Fine sand
	−13.5	−15.5	Fine sand, hard clay
315 G6	+18.0	+10.0	Fill; sand, gravel, clay
	+10.0	+ 7.5	Blue clay, gravel
	+ 7.5	+ 4.0	Peat
	+ 4.0	+ 2.5	Soft silt
	+ 2.5	+ 1.5	Silty sand
316 G6	+16	+ 9	Sand and gravel fill
	+ 9	+ 5	Blue clay, gravel
	+ 5	+ 2	Peat
	+ 2	+ 1	Silty sand
317 H6	+16.5	+11.5	Sand and gravel fill
	+11.5	+ 6.3	Blue clay, little gravel
	+ 6.3	+ 1.5	Silty peat
	+ 1.5	− 1.0	Soft silt
	− 1.0	− 1.5	Silty sand
318 H6	+16.5	+11.0	Fill; clay, sand, gravel
	+11.0	+ 3.5	Blue clay, gravel
319 H6	+17.0	+ 7.0	Coarse sand, little clay
	+ 7.0	+ 3.5	Soft silty peat
	+ 3.5	+ 1.0	Soft silt
	+ 1.0	0	Silty sand, little gravel
320 H5	+16.5	+ 7.5	Sand and gravel fill
	+ 7.5	+ 0.5	Silt and peat, soft
	+ 0.5	− 1.5	Sand and gravel (coarse, hard)
321 H6	+16.5	+ 8.0	Sand and gravel fill, loose
	+ 8.0	+ 3.0	Silt and peat, soft
	+ 3.0	+ 1.0	Coarse sand, gravel
322 H6	+17.0	+ 3.0	Sand and gravel fill
	+ 3.0	+ 0.5	Soft silt
	+ 0.5	− 1.5	Coarse sand, hard
323 H6	+24.5	+16.5	Sand and gravel, loose
	+16.5	+ 9.5	Sand and gravel, fairly hard
324 H5	+17.0	+ 8.0	Fill; sand, gravel, ash
	+ 8.0	+ 2.0	Silt
	+ 2.0	− 0.5	Peat
	− 0.5	− 5.5	Blue clay (hard)

No. and location	Elevations or depths From	To	Formation
325 H5	+17.0	+ 4.5	Fill; sand, gravel, ash
	+ 4.5	+ 0.5	Silt, peat
	+ 0.5	− 4.5	Blue clay
326 I5	+13.0	+10.0	Sand and gravel fill
	+10.0	+ 4.5	Silt, peat
	+ 4.5	0	Blue clay
327 I5	+17.5	+15.5	Sand and gravel fill
	+15.5	+ 4.5	Sand, gravel, clay, very hard
328 I5	+22.5	+20.0	Sand and gravel fill
	+20.0	+ 9.0	Coarse sand, gravel, clay, very hard
329 F6	+ 5.5	+ 2.5	Peat, silt
	+ 2.5	−11.5	Blue clay (little sand)
330 G6	+10.5	+ 3.0	Mud, silt
	+ 3.0	− 5.5	Fine sand
	− 5.5	− 9.5	Blue clay, little sand
331 G6	+11.5	+ 4.5	Mud, silt
	+ 4.5	+ 1.5	Sand, mud
	+ 1.5	− 4.5	Blue clay
332 G6	+15.0	+ 2.5	Fill, mud, silt
	+ 2.5	− 5.0	Coarse sand
	− 5.0	−11.0	Blue clay, sand
333 D6	+17	+ 5	Fill
	+ 5	+ 3	Silt, peat
	+ 3	− 5	Coarse sand
334 D6	+16	+ 3	Fill
	+ 3	− 5	Coarse sand
335 D6	+15.0	+ 2.0	Fill
	+ 2.0	− 8.7	Silt, peat
	− 8.7	−12.5	Hard blue clay, sand
336 D6	+14.5	+ 1.5	Fill
	+ 1.5	− 7.0	Sand
	− 7.0	−10.0	Stiff blue clay
337 G3	+22.5	+21.5	Roadbed
	+21.5	+10.5	Sand, gravel
	+10.5	+ 5.0	Sand, gravel, clay
	+ 5.0	+ 2.0	Brown clay
338 G3	+26.5	+20.5	Sand, gravel
	+20.5	+15.0	Sand, gravel
	+15.0	+ 3.5	Sand, gravel, clay
339 G2	+30.5	+15.5	Sand, gravel, little clay
	+15.5	+ 5.0	Sand, gravel
340 F2	+32.0	+26.0	Sand and gravel fill
	+26.0	+16.0	Coarse sand, gravel
	+16.0	[illegible]4.5	Sand, gravel, clay

No. and location	Elevations or depths From	To	Formation
341 B6	+16.5	+11.5	Hard gravel fill
	+11.5	+ 2.5	Soft clay fill
	+ 2.5	− 2.5	Silty sand
	− 2.5	− 6.5	Peat
	− 6.5	− 8.5	Fine sand, little clay
	− 8.5	−15.5	Stiff yellow clay
342 B6	+15.0	+12.0	Hard sand fill
	+12.0	+ 7.5	Soft mud
	+ 7.5	− 1.0	Soft clay and silt fill
	− 1.0	− 8.0	Stiff yellow clay
343 B6	+15.5	+11.5	Hard sand and gravel fill
	+11.5	+ 2.0	Soft sand and clay fill
	+ 2.0	− 1.2	Silty peat, sand
	− 1.2	− 4.2	Fine sand, little clay
	− 4.2	−12.5	Stiff yellow clay, little sand
344 D6	+14.5	+ 6.5	Fill
	+ 6.5	+ 2.5	Silt, peat
	+ 2.5	− 7.5	Clay, sand
345 D6	+15	+ 3	Fill
	+ 3	− 1	Silt, peat
	− 1	− 9	Sand, little clay
346 D6	+16.0	+ 4.0	Fill
	+ 4.0	− 0.5	Silt, peat
	− 0.5	− 3.5	Stiff blue clay, sand
347 D6	+17.5	+ 4.5	Fill
	+ 4.5	− 1.2	Silt, peat, sand
	− 1.2	− 5.0	Yellow clay, sand
348 G6	+16.0	+ 8.7	Fill; clay, sand, gravel
	+ 8.7	+ 6.0	Peat, clay, sand
	+ 6.0	+ 3.2	Stiff brown peat
	+ 3.2	+ 1.5	Fine sand
	+ 1.5	− 3.0	Stiff blue clay
349 G6	+16.5	+ 9.5	Fill; clay, sand, gravel
	+ 9.5	+ 8.0	Peat, clay, sand
	+ 8.0	+ 5.5	Silt and sand (soft)
	+ 5.5	+ 2.7	Stiff brown peat
	+ 2.7	− 1.5	Sharp sand, fine gravel
350 G5	+16.5	+ 8.2	Fill; clay, gravel, sand
	+ 8.2	+ 6.2	Fill; peat, sand, gravel
	+ 6.2	+ 3.0	Stiff brown peat
	+ 3.0	− 0.5	Very fine sand
	− 0.5	− 4.5	Sand, gravel
351 G5	+17.0	+ 6.0	Fill; clay, sand, gravel
	+ 6.0	+ 2.7	Stiff brown peat
	+ 2.7	− 2.2	Sharp sand, fine gravel

No. and location	Elevations or depths From	To	Formation
352 D7	+16.5	+10.0	Cinder fill
	+10.0	+ 3.0	Ash fill, little clay
	+ 3.0	+ 1.0	Soft silt
353 D7	+17	+12	Fill
	+12	+ 4	Ash fill
	+ 4	0	Sand, fairly hard
354 C7	+17.0	+12.0	Fill
	+12.0	+ 5.5	Ash fill
	+ 5.5	+ 4.5	Sand and peat (soft)
	+ 4.5	+ 2.0	Sand, fairly hard
355 D6	+17.5	+ 6.0	Fill
	+ 6.0	+ 2.0	Silt, peat
	+ 2.0	− 3.0	Coarse sand
	− 3.0	− 7.5	Blue clay, sand
356 L5	+ 9.5	− 1.5	Brown peat
	− 1.5	−10.5	Blue clay
357 L5	+10	− 3	Brown peat
	− 3	−10	Stiff blue clay
358 L5	+ 9.0	− 2.5	Brown peat
	− 2.5	−12.0	Stiff blue clay
359 L5	+10.5	− 1.0	Brown peat
	− 1.0	− 2.5	Silt, sand
	− 2.5	− 5.0	Fine sand
	− 5.0	−11.0	Stiff blue clay, fine sand
360 L6	+ 9.0	+ 7.0	Sand and gravel fill
	+ 7.0	− 5.0	Brown peat
	− 5.0	− 7.5	Fine sand, clay
	− 7.5	−10.0	Stiff blue clay
	−10.0	−12.0	Fine sand
	−12.0	−13.5	Blue clay
	−13.5	−20.0	Fine sand, very soft
	−20.0	−25.0	Blue clay
361 K6	+20	+19	Roadbed
	+19	− 5	Very coarse sand and gravel, little clay
362 K6	+19.5	+18.5	Silt, sand, shells
	+18.5	+ 4.5	Hard yellow clay, sand
363 K6	+ 5.0	+ 3.0	Beach sand, gravel
	+ 3.0	− 9.5	Hard yellow clay, little sand
364 K6	+ 9.5	+ 3.5	Fill; loam, sand, gravel
	+ 3.5	− 0.5	Coarse sand, gravel
	− 0.5	− 8.0	Sharp sand
	− 8.0	−10.5	Yellow clay
365 L6	+13.0	+11.0	Sand and gravel fill
	+11.0	+ 4.0	Stiff brown peat
	+ 4.0	− 2.5	Stiff blue clay, sand
	− 2.5	−12.0	Fine sand, clay

No. and location	Elevations or depths From	To	Formation
366 M6	+10.0	+ 8.0	Silt, sand, shells
	+ 8.0	+ 5.5	Stiff brown peat
	+ 5.5	+ 1.5	Stiff blue clay, sand
	+ 1.5	− 5.0	Hard blue clay, sand
	− 5.0	−11.0	Fine sand, clay
367 L6	+10.5	+ 7.5	Silt, sand
	+ 7.5	+ 6.0	Soft brown peat
	+ 6.0	− 4.5	Fine sand, little clay
368 L6	+12	+10	Silt, sand, shells
	+10	− 2	Fine sand, little clay
369 L6	+12	+10	Silt, sand, shells
	+10	− 3	Fine sand, little clay
370 H4	+15.5	− 5.5	Slag fill
	− 5.5	− 7.5	Blue clay
371 H4	+15.0	+ 9.0	Sand, mud, gravel
	+ 9.0	+ 2.0	Peat
	+ 2.0	− 2.5	Sand, gravel, clay
372 H3	+17.0	+10.5	Sand, gravel, peat
	+10.5	+ 3.5	Mud, clay, peat
	+ 3.5	− 1.5	Sand, gravel
373 H3	+18.0	+12.5	Sand, gravel
	+12.5	+ 8.0	Sand, gravel, peat
	+ 8.0	+ 0.5	Sand, gravel
374 H3	+16.0	+10.0	Fill; cinders, clay, gravel
	+10.0	+ 4.5	Mud, cinders, gravel
	+ 4.5	− 1.0	Blue clay, little gravel
375 G3	+17.0	+ 5.0	Cinders, sand, gravel
	+ 5.0	+ 0.5	Sand, gravel, clay
376 G3	+18.5	+ 2.5	Sand, gravel, stones, clay
377 G3	+19.5	+14.5	Sand, gravel, cinders
	+14.5	+ 3.0	Sand, gravel, clay
378 E9	+16.0	− 1.5	Clay and sand fill
	− 1.5	− 4.5	Soft silt
	− 4.5	− 6.0	Sand, gravel, clay
	− 6.0	− 8.5	Hard yellow clay
379 L6	+11.0	+ 8.5	Silt, sand, shells
	+ 8.5	+ 7.0	Stiff brown peat
	+ 7.0	+ 4.0	Soft blue clay
	+ 4.0	+ 1.0	Fine sand, little clay
	+ 1.0	− 4.0	Fine sand, clay
380 L6	+13.0	+11.0	Silt, sand
	+11.0	+10.5	Stiff brown peat
	+10.5	− 2.0	Fine sand, little clay

No. and location	Elevations or depths From	To	Formation
381 K6	+12.0	+ 6.5	Silt, sand, peat
	+ 6.5	— 3.0	Fine sand, little clay
382 K6	+13.5	+ 7.0	Sand and gravel fill
	+ 7.0	+ 4.5	Stiff brown peat
	+ 4.5	— 6.5	Stiff blue clay, sand
383 E9	+16	+ 6	Sand and gravel fill
	+ 6	+ 2	Soft blue clay fill
	+ 2	— 3	Silty peat
	— 3	— 9	Clay and sand fill
	— 9	—14	Stiff blue clay
384 M5	+ 8.0	— 4.0	Peat, silt, sand
	— 4.0	— 8.5	Stiff blue clay, sand
	— 8.5	—17.5	Fine sand, clay
385 M5	+ 4.5	— 1.0	Silt, sand, shells
	— 1.0	—11.0	Stiff blue clay, sand
	—11.0	—14.0	Fine sand, clay
	—14.0	—16.0	Fine sand, clay
386 M5	+ 3.0	+ 1.5	Soft silt, sand
	+ 1.5	— 4.0	Stiff brown peat
	— 4.0	— 7.5	Stiff blue clay, sand
	— 7.5	—17.0	Fine sand, clay
387 M6	+15.5	+10.5	Fill; loam, sand, gravel
	+10.5	+ 4.0	Fill; silt, sand, gravel
	+ 4.0	+ 0.5	Fine sand, clay
	+ 0.5	— 1.0	Silt, sand, gravel
	— 1.0	— 3.5	Fine sand
	— 3.5	—29.0	Fine sand, very little clay
388 N6	+13.0	+ 8.5	Sand, gravel
	+ 8.5	+ 6.5	Soft blue clay
	+ 6.5	+ 1.0	Fine sand, little clay
	+ 1.0	— 0.5	Blue clay
	— 0.5	— 4.0	Fine sand, little clay
	— 4.0	—10.0	Sand, gravel, very little clay
	—10.0	—15.0	Sand, gravel, clay —hard
389 N6	+12.5	+ 9.0	Sand and gravel fill
	+ 9.0	+ 7.0	Clay, little gravel
	+ 7.0	+ 5.0	Coarse sand, gravel
	+ 5.0	— 1.0	Fine sand
	— 1.0	— 5.0	Fine sand
	— 5.0	—18.5	Sand, gravel
390 N6	+11.5	— 2.0	Peat, sand
	— 2.0	— 9.0	Fine sand
	— 9.0	—15.0	Sand, gravel, water
	—15.0	—18.5	Coarse gravel, sand
391 N5	+ 8.5	+ 0.5	Peat
	+ 0.5	— 2.5	Sand, gravel, little clay
	— 2.5	— 6.0	Coarse gravel
	— 6.0	— 7.5	Clay, sand, gravel
	— 7.5	— 9.0	Hard blue clay
	— 9.0	—16.5	Sand, gravel, clay
392 J4	+18.5	+14.0	Fill; sand, gravel, clay
	+14.0	— 3.5	Yellow clay, gravel
	— 3.5	—13.5	Blue clay, gravel, stones
393 K4	+19.5	+18.0	Sandy loam
	+18.0	+ 5.0	Yellow clay, gravel
	+ 5.0	—16.5	Blue clay, gravel
394 K4	+18.0	+16.5	Loam
	+16.5	+ 5.5	Yellow clay, gravel, small stones
	+ 5.5	—14.5	Blue clay, gravel
395 K4	+18.5	+17.0	Loam
	+17.0	+ 7.5	Yellow clay, gravel
			Rock or boulder
396 J6	+ 3	— 5	Silt, sand
	— 5	—10	Coarse sand, gravel
397 J7	+ 3	— 3	Silt, sand, shells
	— 3	—10	Sand, gravel
398 I7	+ 3.0	— 2.5	Silt, sand
	— 2.5	— 9.0	Coarse sand, gravel
399 I7	+ 3.0	+ 0.5	Silt, sand
	+ 0.5	— 0.5	Fine sand
	— 0.5	— 6.0	Hard blue clay
400 N6	+17.5	+ 6.5	Fill; sand, gravel, clay
	+ 6.5	+ 2.5	Peat
	+ 2.5	+ 1.0	Fine sand
	+ 1.0	— 9.0	Stiff blue clay
401 N6	+18.0	+ 6.5	Fill; sand, gravel, clay
	+ 6.5	+ 1.5	Peat
	+ 1.5	— 5.5	Fine sand
	— 5.5	— 9.0	Sand, gravel, stones
402 N6	+18.5	+13.5	Fill; sand, gravel, clay
	+13.5	+ 8.0	Peat
	+ 8.0	+ 3.0	Fine sand
	+ 3.0	— 2.0	Sand, gravel, stone
	— 2.0	— 5.5	Sand, gravel, little clay
403 M6	+17	+13	Fill
	+13	— 7	Silt
	— 7	—22	Fine sand, clay
	—22	—25	Stiff blue clay
404 M6	+16.5	+13.0	Fill
	+13.0	+ 2.0	Peat
	+ 2.0	—18.0	Fine sand, clay
	—18.0	—25.0	Stiff blue clay

No. and location	Elevations or depths From	To	Formation
405 M6	+17.5	+13.0	Fill
	+13.0	+ 5.0	Sand, gravel and fill
	+ 5.0	—10.0	Sand, little clay
	—10.0	—15.0	Stiff blue clay
406 M6	+17	+13	Fill
	+13	+ 9	Fill; sand, gravel, stone
	+ 9	— 2	Sand, little clay
	— 2	—12	Stiff blue clay
407 N6	+16.5	+11.0	Fill; cinder, gravel, sand
	+11.0	+ 4.5	Silt
	+ 4.5	— 6.5	Yellow clay, stones
	— 6.5	— 9.5	Blue clay, stones
408 N6	+17.0	+11.5	Fill; cinder, gravel, sand
	+11.5	+10.0	Fine sand
	+10.0	— 9.0	Sand, gravel, small stones
409 M5	+11	+ 6	Gravel fill
	+ 6	+ 1	Peat
	+ 1	— 1	Very coarse sand
410 M5	+11.0	+ 3.0	Gravel fill
	+ 3.0	+ 1.0	Peat
	+ 1.0	— 1.5	Sand, gravel
411 M4	+11.5	+ 2.0	Gravel fill
	+ 2.0	— 1.0	Peat
	— 1.0	— 2.0	Sand, gravel
412 M4	+12	+ 2	Sand, gravel
413 M4	+12.5	+ 3.5	Sand, gravel
414 P8	+10	— 2	Peat
	— 2	— 9	Sand, gravel
415 P7	+10.5	— 1.5	Peat
	— 1.5	— 6.5	Sand, gravel
	— 6.5	— 9.5	Sand, clay
416 P7	+11.0	+ 6.5	Peat
	+ 6.5	+ 3.0	Blue clay
	+ 3.0	— 7.0	Yellow clay, gravel
417 Q7	+14.0	+12.5	Loam
	+12.5	+10.0	Sand, gravel
	+10.0	— 4.5	Clay, sand, gravel
418 Q7	+12.0	+10.5	Peat
	+10.5	— 6.0	Clay, sand, gravel
419 Q7	+13	+12	Peat
	+12	— 5	Clay, sand, gravel
420 O7	+11.0	+ 1.5	Peat
	+ 1.5	— 2.5	Sand, gravel, stones
	— 2.5	—12.0	Stiff blue clay, gravel
421 O7	+10.0	— 0.5	Peat
	— 0.5	— 5.0	Coarse sand
	— 5.0	—10.0	Stiff blue clay
422 P7	+10	— 2	Peat
	— 2	— 6	Sand, gravel
	— 6	—11	Stiff blue clay
423 P7	+10	— 2	Peat
	— 2	— 8	Sand, coarse gravel
424 P8	+ 9.5	— 1.0	Peat
	— 1.0	— 7.0	Sand, coarse gravel
	— 7.0	—10.0	Sand, clay
425 D10	+14.5	+ 7.5	Sand and gravel fill
	+ 7.5	+ 0.5	Soft blue clay, fill
	+ 0.5	—10.5	Fill; clay, sand, gravel
	—10.5	—16.5	Stiff blue clay
426 D10	+15.5	+ 6.0	Sand and gravel fill
	+ 6.0	— 0.5	Soft blue clay fill
	— 0.5	— 7.0	Fill; clay, sand, gravel
	— 7.0	—14.0	Stiff blue clay
427 E10	+17.5	+ 9.5	Sand and gravel fill
	+ 9.5	+ 0.5	Soft blue clay fill
	+ 0.5	— 4.5	Fill; clay, sand, gravel
	— 4.5	—12.5	Stiff blue clay
428 E10	+17	+ 8	Sand and gravel fill
	+ 8	+ 3	Soft blue clay fill
	+ 3	— 3	Silty peat
	— 3	— 6	Fill; clay, sand, gravel
	— 6	—13	Stiff blue clay
429 E10	+16.5	+ 9.5	Sand and gravel fill
	+ 9.5	+ 1.5	Fill; soft blue clay, gravel
	+ 1.5	— 3.5	Silty peat
	— 3.5	— 7.5	Clay and sand fill
	— 7.5	—13.5	Stiff blue clay
430 A5	Harbor bed		
	—40	—48	Mud
	—48	—91	Stiff blue clay
	—91	—94	Sand, gravel, stiff clay
431 A5	Harbor bed		
	—40	—49	Mud
	—49	—91	Stiff blue clay
	—91	—94	Stiff clay, some gravel
432 A5	Harbor bed		
	—36	—41	Mud
	—41	—66	Stiff blue clay
	—66	—74	Stiff clay
	—74	—88	Stiff clay, gravel
433 A5	Harbor bed		
	—37	—40	Mud
	—40	—81	Stiff blue clay
	—81	—91	Stiff clay, some gravel

No. and location	Elevations or depths From	To	Formation
434 Harbor bed			
A5	−21	−28	Mud
	−28	−74	Stiff blue clay
	−74	−76	Gravel
	−76	−85	Stiff clay
435 Harbor bed			
A5	−40	−43	Mud
	−43	−87	Stiff clay
	−87	−91	Sand, gravel, stiff clay
436 Harbor bed			
A5	−19	−21	Mud
	−21	−39	Medium clay
	−39	−57	Clay, some sand
	−57	−81	Clay, some gravel
	−81	−91	Soft clay
437 Harbor bed			
A5	−18	−20	Mud
	−20	−44	Medium clay
	−44	−70	Clay, little gravel
	−70	−96	Medium clay
	−96	−101	Hard clay, sand, gravel
438 Harbor bed			
A5	−34	−38	Mud
	−38	−54	Medium clay
	−54	−67	Clay, gravel
	−67	−87	Medium clay
	−87	−92	Clay, some gravel
	−92	−100	Hard clay, sand, gravel
439 Harbor bed			
A5	−34	−38	Mud
	−38	−56	Medium clay
	−56	−79	Medium clay, gravel
	−79	−83	Clay
	−83	−96	Hard clay, gravel
	−96	−100	Sand, gravel
440 Harbor bed			
A5	−33	−38	Mud
	−38	−62	Medium clay
	−62	−93	Soft clay
	−93	−100	Hard clay, gravel
441 Harbor bed			
A5	−34	−38	Mud
	−38	−63	Medium clay
	−63	−74	Soft clay
	−74	−100	Hard clay, gravel
442 Harbor bed			
A5	−35	−39	Mud
	−39	−58	Medium clay
	−58	−72	Soft clay, some gravel
	−72	−79	Soft clay
	−79	−98	Medium clay
	−98	−101	Hard clay, gravel
443 Harbor bed			
A5	−35	−37	Mud
	−37	−62	Clay
	−62	−79	Clay, gravel
	−79	−94	Soft clay
	−94	−102	Clay, gravel

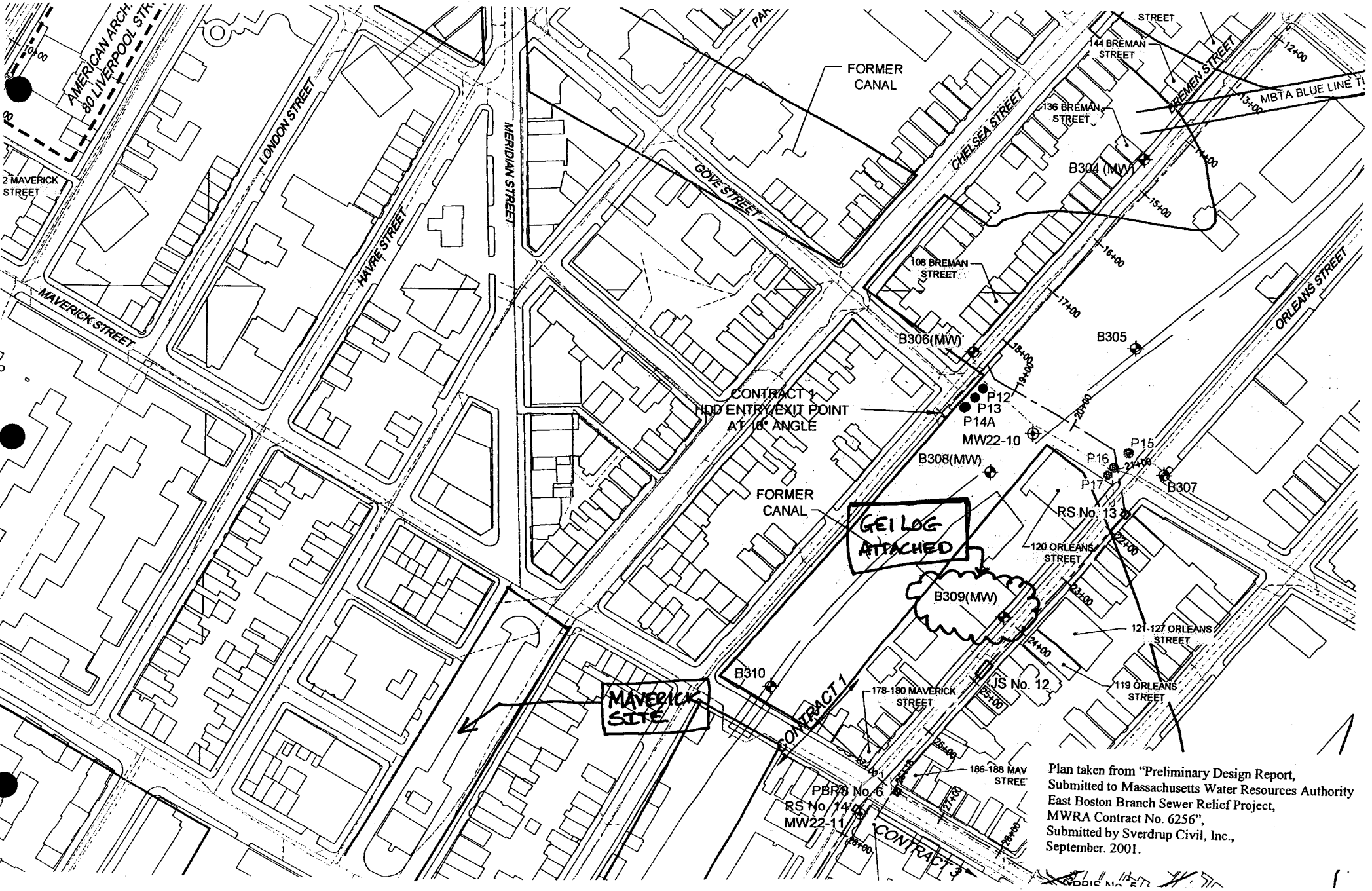
No. and location	Elevations or depths From	To	Formation
444 Harbor bed			
A5	−34	−38	Mud
	−38	−52	Medium clay
	−52	−58	Clay, sand, gravel
	−58	−60	Sand, gravel
	−60	−74	Sand, clay, gravel
	−74	−88	Loose sand, gravel
	−88	−104	Hard clay, sand, gravel
445 Harbor bed			
A5	−35	−38	Mud
	−38	−75	Medium clay
	−75	−80	Soft clay
	−80	−92	Clay, gravel
			Rock or boulder
446	+16	+ 8	Fill
D4	+ 8	+ 6	Fine silty sand, mud
	+ 6	− 2	Hard packed coarse sand
	− 2	− 6	Compact fine sand
	− 6	−12	Hard blue clay
447	+15	+ 4	Fill
C5	+ 4	+ 1	Fine silty sand, mud
	+ 1	− 7	Fine sand, clay
	− 7	−31	Medium blue clay
448	+18	+ 8	Fill
C5	+ 8	+ 4	Peat, mud
	+ 4	− 6	Hard yellow clay
	− 6	−26	Hard blue clay
	−26	−36	Medium blue clay
	−36	−40	Fine sand, some clay
449	+20	+ 7	Hard yellow clay,
B5			sand, gravel, rocks
	+ 7	−34	Hard blue clay, sand, gravel, rocks
	−34	−38	Boulders
	−38	−60	Hard blue clay, sand, gravel, stones
450	+17	+ 5	Fill
B5	+ 5	− 2	Fine silty mud, sand
	− 2	−14	Hard yellow clay
	−14	−20	Hard blue clay, sand, gravel
	−20	−25	Hard packed sand, gravel
	−25	−64	Hard blue clay, gravel
	−64	−78	Hard blue clay, gravel, stones
451 Harbor bed			
A5	−28	−30	Fine silty sand, mud
	−30	−95	Soft blue clay
452 Harbor bed			
A5	−34	−39	Fine silty sand, mud
	−39	−104	Soft blue clay

No. and location	Elevations or depths From	To	Formation
453 Harbor bed			
A5	−34	−37	Fine silty sand, mud
	−37	−96	Soft blue clay
454 Harbor bed			
A5	−34	−40	Fine silty sand, mud
	−40	−96	Soft blue clay
455 Harbor bed			
A5	−36	−40	Fine silty sand, mud
	−40	−94	Soft blue clay
456 Harbor bed			
A5	−35	−39	Fine silty sand, mud
	−39	−95	Soft blue clay
457 Harbor bed			
A5	−35	−40	Silty sand, mud
	−40	−76	Soft blue clay
	−76	−86	Soft blue clay, layer fine sand
	−86	−96	Hard blue clay, sand, gravel
458 Harbor bed			
A5	−34	−40	Silty sand, mud
	−40	−60	Soft blue clay
	−60	−75	Soft blue clay, thin layer fine sand
	−75	−95	Hard blue clay, sand, gravel
459 Harbor bed			
A5	−36	−41	Silty sand, mud
	−41	−54	Soft blue clay
	−54	−56	Soft blue clay, sand
	−56	−87	Soft blue clay
	−87	−96	Hard packed sand, gravel, some clay
474	+16.4	+14.9	Cinder fill
F10	+14.9	+ 6.9	Clay fill
	+ 6.9	− 4.1	Silt, little fine sand
	− 4.1	− 6.1	Firm coarse gravel
	− 6.1	−12.1	Hard yellow clay, little fine sand
	−12.1	−53.6	Soft blue clay, little fine sand
475	+16.3	+13.8	Firm cinder and stone fill
F10	+13.8	+ 1.3	Fill; loose sand, gravel, clay
	+ 1.3	− 1.2	Soft silt, little sand
	− 1.2	− 4.7	Silty sand, shells
	− 4.7	− 6.2	Loose coarse sand
	− 6.2	− 9.7	Hard yellow clay
	− 9.7	−53.7	Soft blue clay
	−53.7	−55.7	Hard sand, gravel
476	+15.9	+14.9	Cinder fill
F10	+14.9	− 1.6	Fill; sand, gravel, clay, silt
	− 1.6	− 6.6	Peaty silt, little sand
	− 6.6	−12.6	Medium yellow clay
	−12.6	−53.6	Soft blue clay
	−53.6	−56.1	Hard sand, gravel, clay and boulders

No. and location	Elevations or depths From	To	Formation
477	+15.5	+14.0	Firm cinder fill
G10	+14.0	− 3.5	Soft clay fill
	− 3.5	− 6.0	Silty sand, little shells
	− 6.0	− 8.0	Firm sand, little clay
	− 8.0	−11.5	Hard yellow clay
	−11.5	−48.5	Soft blue clay
	−48.5	−50.0	Firm coarse sand
478	+15.7	+14.7	Cinder fill
G9	+14.7	+ 5.2	Blue clay fill
	+ 5.2	− 7.3	Silty and fine sand
	− 7.3	− 8.3	Hard yellow clay
	− 8.3	−17.8	Hard yellow clay, little sand
	−17.8	−71.8	Soft blue clay, little fine sand
479	+16.8	+14.3	Firm cinder and stone fill
F10	+14.3	+ 6.8	Fill; sand, gravel, clay
	+ 6.8	+ 1.8	Soft clay fill
	+ 1.8	− 2.2	Fill; sand, gravel, clay
	− 2.2	− 4.7	Soft silt
	− 4.7	− 5.7	Silty sand, shells
	− 5.7	−10.7	Hard yellow clay, little fine sand
	−10.7	−25.2	Soft blue clay
480	+15.4	+14.4	Cinder fill
G10	+14.4	− 5.6	Silty sand fill
	− 5.6	− 9.1	Loose medium silty sand
	− 9.1	−17.6	Medium yellow clay
	−17.6	−33.1	Soft blue clay
481	+15.7	+14.2	Firm cinder fill
G10	+14.2	+10.2	Soft clay fill
	+10.2	− 1.8	Soft silt, little shells
	− 1.8	− 5.8	Silty sand, shells
	− 5.8	− 9.3	Firm coarse sand
	− 9.3	−29.3	Soft blue clay
482	+14.0	+13.0	Firm cinder fill
G10	+13.0	+ 7.5	Soft clay fill
	+ 7.5	+ 1.0	Soft silt
	+ 1.0	− 6.0	Silty sand, silt, shells
	− 6.0	−13.0	Hard yellow clay
	−13.0	−33.0	Soft blue clay
483	+14.4	+12.4	Fill; sand, gravel, cinder
G9	+12.4	+ 0.9	Clay fill
	+ 0.9	− 6.1	Fine silty sand
	− 6.1	−12.6	Coarse sand, little fine gravel
	−12.6	−35.6	Soft blue clay, very little fine sand
484	+17.1	+16.1	Cinder fill
F11	+16.1	+ 0.1	Fill; sand, gravel, clay, silt
	+ 0.1	− 7.9	Loose silty sand
	− 7.9	−16.4	Medium yellow clay
	−16.4	−22.9	Soft blue clay

Appendix B: Information By Others

3. Monitoring well installed by GEI Consultants, Inc. for the MWRA



Plan taken from "Preliminary Design Report, Submitted to Massachusetts Water Resources Authority East Boston Branch Sewer Relief Project, MWRA Contract No. 6256", Submitted by Sverdrup Civil, Inc., September. 2001.

GEI Consultants, Inc.

LOG OF DRILL HOLE

B309(MW)

PAGE: 1 OF 1

DATE: 10/11/00 / 10/11/00

PROJECT NAME: E. Boston Sewer Relief

PROJECT NUMBER: 00103-EBOSTON-MWRA

BORING LOCATION: Orleans Street

GROUND SURFACE ELEVATION (NGVD-FT): 115.65

NORTHING: 781478.62 EASTING: 2960193.78

DRILLED BY: Earth Exploration, Inc.

LOGGED BY: L. Clark TOTAL DEPTH (FT): 29.00

LEGEND

1) BLOWS PER 6 IN.-140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
2) PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
3) REC - RECOVERY LENGTH OF SAMPLE

S - SPLIT SPOON SAMPLE 2.0 in. dia
CS - SPLIT SPOON SAMPLE 2 1/2 in. dia.
SSA - SOLID STEM AUGERS
HSA - HOLLOW STEM AUGERS
UF - FIXED PISTON
U - SHELBY TUBE
FJC - FLUSH JOINT CASING

GROUNDWATER ▽ ESTIMATED GROUNDWATER ▽

NOTES: Advanced boring using drive and wash technique. HW 4" casing to 14'. Open hole 14'-29'.

Drummed soil cuttings and drill water for disposal.

2" ID monitoring well installed, screen 10'-20'.

Date Groundwater level measured: 11/9/00

DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	OVM (ppm)	GW Level	LOG	SOIL DESCRIPTION
0	S1	10-10-6-10	24	10	-			12" Concrete. S1 - Top 9": Silty SAND (SM); ~65% medium to coarse sand; ~15% silty fines; 10% fine sand; ~10% fine, subangular gravel; trace brick; trace asphalt; dark brown; Fill.
5	S2	16-6-7-6	24	0	-			S1 - Bottom 1": Sandy Lean CLAY (CL); ~60% medium plasticity clayey fines; ~30% fine to coarse sand; 10% fine, subangular gravel; trace brick; light brown; Fill. S2 - No Recovery.
10	S3	58-12-6-7	24	1	-			S3 - Piece of gravel, 3/4" diameter; trace light brown Silty Sand.
15	U1	Push	24	24	-	▽		U1 - Lean CLAY with Sand (CL); ~80% medium to high plasticity clayey fines; ~20% fine to medium sand; gray; Marine Clay.
20	S4	23-20-26-29	24	10	-			S4 - Silty SAND (SM); ~75% fine sand; ~15% silty fines; 10% medium sand; gray; Interbedded Silt and Sand.
25	S5	13-17-23-24	24	15	-			S5 - Similar to S4, with layers of Lean Clay with Sand up to 2" thick; Interbedded Clay and Sand.

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Table 2 - Summary of Groundwater Monitoring Well Readings
East Boston Branch Sewer Relief Project
MWRA Contract #6256
Construction Contract 3
East Boston, Massachusetts

Boring Number	Northing	Easting	Surface Elevation (feet)	Screen Interval		Reading 1							Reading 2						
				Top Elevation (feet)	Bottom Elevation (feet)	Date	Time	Water Elevation (feet)	High Tide[1]		Low Tide[1]		Date	Time	Water Elevation (feet)	High Tide[1]		Low Tide[1]	
									Time	Tide Elevation	Time	Tide Elevation				Time	Tide Elevation	Time	Tide Elevation
B301(MW)	2961467.8	780243.1	116.7	106.7	96.7	11/6/00	11:50	102.3	18:42	109.8	12:10	102.3	11/9/00	13:40	102.2	21:32	110.3	13:05	102.4
B302(MW)	2961124.0	781832.9	115.0	105.0	95.0	11/9/00	10:45	100.3	9:10	109.7	15:08	102.4	11/20/00	7:15	99.5	5:18	110.2	11:21	101.7
B304 (MW)	2960871.0	781675.4	116.7	106.7	96.7	11/6/00	11:00	100.5	6:30	109.1	12:25	103.1	11/20/00	9:20	101.4	5:18	110.2	11:21	101.7
B306(MW)	2960581.4	781427.8	115.2	105.2	95.2	11/6/00	10:00	106.7	6:30	109.1	12:25	103.1	11/9/00	8:30	105.7	9:10	109.7	2:52	102.0
B308A(MW)	2960405.1	781455.8	108.4	98.4	88.4	11/6/00	8:30	103.5	6:30	109.1	12:25	103.1	11/17/00	8:15	102.0	2:31	110.9	8:35	101.0
B309(MW)	2960193.8	781478.6	115.7	105.7	95.7	11/9/00	10:00	101.8	9:10	109.7	15:08	102.4	11/16/00	14:15	101.3	13:56	111.9	20:19	100.0

Notes:
1. Tide information from the National Oceanic and Atmospheric Administration/National Ocean Service tide predictions for Boston, Massachusetts.

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Appendix C: Information on Adjacent Buildings

Available Information on Adjacent Buildings

Building Address	Property ID	Built in	Floors	Description	Foundation	Basement
BHA Building L	BHA Building L	1974	2	brick, residential	Driven Pipe Piles	Yes
BHA Building M	BHA Building M	1974	2	brick, residential	Driven Pipe Piles	Yes
BHA Building F	BHA Building F	1974	2	brick, residential	Driven Pipe Piles	Yes
BHA Building G	BHA Building G	1974	2	brick, residential	Driven Pipe Piles	Yes
225 Summer Street		Post 1995	5	brick, residential	N/A	N/A
1-3 Maverick Square	Bar	Pre 1936	1	blockwork masonry, commercial	Continuous stone footing with concrete footings in the middle	Yes
5-7 Maverick Square	Hong Kong Harbor	N/A	1	blockwork masonry, commercial	N/A	N/A
9-11 Maverick Square	Las Americas Travel	N/A	1	blockwork masonry, commercial	N/A	Yes
13-15 Maverick Square	Dunkin Donuts	N/A	1	blockwork masonry, commercial	N/A	N/A
17 Maverick Square	Clippership Wine & Spirit	N/A	1	blockwork masonry, commercial	N/A	N/A
19 Maverick Square	Western Union	N/A	1	blockwork masonry, commercial	N/A	N/A
21-23 Maverick Square		N/A	4		N/A	N/A
25 Maverick Square		N/A	4		N/A	N/A
35 Maverick Square		N/A	4		N/A	N/A
37 Maverick Square		N/A	4		N/A	N/A
43 Maverick Square		N/A	4		N/A	N/A
45-47 Maverick Square		N/A	2	brick, commercial	N/A	N/A
57-59 Maverick Square		Pre 1945	4	brick, comm. & res.	Continuous spread footing with brick piers in the middle of the footprint	Yes
61-63 Maverick Square		Pre 1945	4	brick, comm. & res.	Continuous spread footing with brick piers in the middle of the footprint	Yes
65-67 Maverick Square		Pre 1945	4	brick, comm. & res.	Continuous spread footing with brick piers in the middle of the footprint	Yes
69-71 Maverick Square		Pre 1916	4	brick, comm. & res.	Continuous spread footing	Yes
73 Maverick Square	Bella's Market	N/A	2	wood over brick, comm. & res.	N/A	N/A
42-44 Maverick Square		N/A	1	stone masonry, commercial	N/A	N/A
40 Maverick Square	La Sultana Bakery	N/A	1	stone masonry, commercial	N/A	N/A
36-38 Maverick Square		N/A	1	stone masonry, commercial	N/A	N/A
34 Maverick Square	Bar and Grill	N/A	1	stone masonry, commercial	N/A	N/A
20-30 Maverick Square		N/A	1	brick, commercial	N/A	N/A
12-16 Maverick Square	Store 24 / Honeydew Donuts	N/A	1	masonry, commercial	N/A	N/A
3 Lewis Mall		N/A	4	brick, comm. & res.	N/A	N/A
BHA Community Building	BHA Community Building	1975	2	brick, residential	Masonry piers onto MBTA Tunnel & onto new concrete slab above granite blocks	Yes
BHA Building B	BHA Building B	1974	4	brick, residential	Driven Pipe Piles	Yes

NOTES:

1. N/A - Information Not Available

SECTION 02010

GEOTECHNICAL INSTRUMENTATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies surveying, furnishing, installing, protecting, reading, reporting, maintaining and removing instrumentation as part of a Geotechnical Monitoring Program required for evaluation of ground movements and groundwater levels during construction, and their effects on adjacent structures. The locations of all instruments and monitoring points are shown on the Contract Drawings. The Work includes implementing required remedial and precautionary measures based on instrumentation data. Work to be performed on or within MBTA structures requires coordination directly with the MBTA and must be performed in accordance with MBTA requirements.

B. Geotechnical instrumentation shall be provided for monitoring of the following activities:

1. Excavation support systems for construction of proposed headhouse and for the waterproofing work on the tunnel roof.

2. Dewatering operations;

3. Vibration-producing activity.

C. The purpose of this program is to provide data which when used with other observations and measurements will be the basis of:

1. Pre-construction baseline data for comparison with construction and post-construction data.

2. Evaluation of adequacy of ground support systems, compaction, or other vibration-producing construction activity and any required modifications of such systems or operations.

D. Work in connection with the Geotechnical Monitoring Program shall include, but not necessarily be limited to the following:

1. Borehole drilling where necessary for installation of instrumentation.

2. Furnishing and installing geotechnical instrumentation and respective readouts.

3. Surveying, monitoring, reporting and interpreting instrumentation data.

E. Instrumentation Layout

1. Locations and type of instruments to be installed are shown on the Contract Drawings.

2. Engineer reserves the right to modify the instrument layout as is deemed necessary to monitor the impact of the Contractor's proposed method of construction.

F. Related work specified elsewhere:

Section 02200	Earthwork
Section 02290	Dewatering
Section 02295	Support of Excavation

G. The MBTA is not responsible for the safety of the Work based on data from the Contractor's or the Engineer's monitoring program.

1.02 QUALITY ASSURANCE

A. All equipment shall be approved by the Engineer.

B. Materials, designs and construction shall be of highest quality to provide robust, corrosion and vibration resistant instruments. Accuracy and dependability of equipment shall be selected considering changes in temperature, humidity, stray currents or other adverse conditions that may be encountered.

C. Installation procedures acceptable to the Engineer shall be developed for each type of instrumentation. All instrumentation shall be installed in presence of the Engineer.

D. Qualifications

1. Manufacturer: Select a firm regularly engaged in the manufacture of monitoring instrumentation of the type specified herein.

2. Personnel:

a. Geotechnical Instrumentation Engineer: Employ a Professional Engineer, registered in the Commonwealth of Massachusetts, specializing in geotechnical engineering, who has experience in installation of instruments of the type specified in this Section in accordance with the manufacturer's recommendations and to the satisfaction of the Engineer. The Contractor's Geotechnical Instrumentation Engineer shall supervise and direct instrument installation technicians and shall be responsible for instrument installation monitoring, reduction and interpretation of instrumentation monitoring data.

b. Qualified geotechnical instrumentation personnel must be available on call at all times during the work that would affect geotechnical instrumentation.

c. Provide a Land Surveyor, Registered in the Commonwealth of Massachusetts, responsible for layout and subsequent verification of all instrument locations and elevations.

E. Tolerances

1. Establish the initial coordinates of each instrument at the point of installation to 0.03 foot or less.

2. Establish the initial elevation of settlement reference points to 0.005 feet. Achieve level circuit closure with an error of closure of 0.01 foot, or less.

F. The Engineer may perform supplemental monitoring of instrumentation and will require Contractor support as follows:

1. Make probes, sensors, and read-out devices available as required.

2. Coordinate activities to minimize interference.

3. Remove obstruction from line of sight when requested by the Engineer.

4. Regulate traffic during instrument surveying operations.

5. Temporarily cease activities that create hazards to instrument monitoring or surveying personnel.

G. A factory calibration shall be conducted on all instruments prior to shipment. Certification shall be provided to indicate that the test equipment used for this purpose is calibrated and maintained in accordance with the test equipment manufacturer's calibration requirements and that, where applicable, calibrations are traceable to the National Institute of Standards and Technology.

H. A final quality assurance inspection shall be made prior to shipment. During the inspection, a checklist shall be completed to indicate each inspection and test detail. A completed copy of the checklist shall be supplied with each instrument.

I. Contractor shall provide the manufacturer's warranty for each portable readout unit furnished for the Engineer's monitoring program.

1.03 SUBMITTALS

A. Qualifications:

1. Submit qualifications of Geotechnical Instrumentation Engineer

B. Working Drawings:

1. Submit Working Drawings of instrumentation location layout and details in accordance with Section 01300 before installation. Indicate methods of installation and maintenance for instrumentation systems.

C. Documentation:

1. Submit manufacturer's catalogs and printed installation instructions for instruments furnished.

2. Submit, within 24 hours of completion of equipment installation, three copies of installation notes, initial readings, and monitoring data taken immediately after installation.

D. Certification:

1. Submit certification of equipment manufacturers, supervision, installation crews, and monitoring personnel at least 21 calendar days prior to installation.

2. Submit certificates of equipment calibration.

E. Monitoring Documentation:

1. Unless otherwise provided by the Engineer, submit proposed forms to be used for recording observations, monitoring and reporting data. Submit a sample showing proposed format for recording of readings, calculations and plots.

2. Submit the following within 12 hours after monitoring any instrument:

a. A copy of the data sheet containing a cumulative history of all readings, including weather conditions at time of each reading.

b. A copy of the plot of measured value versus time, which also includes a time history of construction activity likely to influence such readings (e.g. depth of excavation, presence of heavy equipment).

3. Each week the Contractor shall submit to the Engineer a weekly data report together with all new data on magnetic disk (3-1/2 in. or 5-1/4 in.) or by e-mail, in Excel or other spreadsheet format approved by the Engineer.

1.04 RESPONSIBILITIES OF CONTRACTOR

A. Furnish components of instrumentation that are to be installed during construction, portable readout units for the Contractor's use, portable readout units for the Engineer's use, and install instruments. The Contractor shall protect and maintain installed instruments and replace or repair damaged or inoperative instruments.

B. Maintain and calibrate portable readout units. Maintain readout unit(s) at the Site for use by the Engineer

C. Collect, reduce, process, plot, interpret, and report data from instrumentation; henceforth the monitoring program.

D. Provide safe access to the Engineer for data collection. Coordinate with the Engineer to verify the consistency of collected data. Implement remedial measures based on interpretations of monitoring program data.

E. Contractor is responsible for obtaining all necessary permits for installation of all specified instruments.

1.05 JOB CONDITIONS

A. Disclosure of Instrumentation Data:

1. Do not disclose instrumentation monitoring data to third parties and do not publish instrument monitoring data without the prior approval of the Engineer. The data from the instrumentation program shall be the property of the MBTA.

2. Be responsible for interpretation of instrumentation data as input to evaluating excavation performance and controlling settlements to prevent damage to structures, facilities and utilities.

3. The Engineer will also interpret the instrument monitoring data and will make the interpretation available to the Contractor.

B. Determine exact location of the instruments to be installed in the field with approval of the Engineer.

C. Access to Instruments: Provide and facilitate safe access to each instrument for the Engineer at all times. Access includes ladders, working platforms and other necessary facilities, and the removal thereof.

1.06 MONITORING SCHEDULE

A. All equipment and installation accessories required for operation of instrumentation system and recording of measurements shall be furnished by Contractor and shall be available at least four (4) weeks in advance of construction in the area where they are to be installed and shall be securely stored where they will not suffer physical damage or damage arising from excessive moisture, extremes of temperature or other adverse conditions.

B. Contractor shall provide and maintain adequate lighting and provide a safe means of access to all instruments to allow installation, repair, and reading of instruments at times selected by Engineer.

C. Tilt plates, surface settlement points, and structural settlement points shall be installed and initial surveys complete a minimum of two (2) weeks prior to any construction activity related to excavation or installation of earth support system.

D. Observation wells shall be installed and initial surveys completed a minimum of two weeks prior to any construction activity.

E. The instruments shall be monitored in accordance with the requirements of Table 1 specified herein.

F. If, in the opinion of Engineer, there appears to be excessive movement, the monitoring points shall be surveyed as often as deemed necessary by Engineer, at no additional cost to the Authority.

PART 2 - PRODUCTS

2.01 MATERIALS FOR INSTRUMENTATION

A. All instrumentation hardware, protective covers, read-out equipment, and equipment and materials necessary to conduct the monitoring program shall be purchased or rented by the Contractor. Prior to installation, all materials and equipment shall be available for inspection by the Engineer to ensure compliance with these specifications.

B. Surface protection shall be flush with the ground surface in paved or other areas.

C. For each instrument type, provide an instruction manual that shall include the following:

1. A description of the purpose of the instrument.

2. Theory of operation.

3. Step-by-step procedures for:

   a. Pre-installation acceptance test when instruments are received on site, to ensure the instruments are functioning correctly prior to installation.

   b. Calibration of readout units.

4. A list of calibration equipment required, and recommended frequency of calibration.

5. Step-by-step instrument installation procedure including materials, tools, spare parts and any borehole requirements, and post-installation acceptance tests.

6. Maintenance procedure.

7. Step-by-step data collection procedure.

8. Data reduction, processing, and plotting procedures.

D. All graduations shall be in U.S. Customary Units, for example feet, inches, pounds.

2.02 DEFORMATION MONITORING POINTS

A. Deformation monitoring points (DMPs) shall be used to monitor vertical and horizontal deformation of various facilities at selected locations shown on the Contract Drawings.

B. The following types of DMPs shall be used to monitor deformation:

1. Surface Settlement Points (SSP) shall consist of a 2-in.-long masonry nail with an identification tag. The nail shall be manufactured from hardened, zinc-plated steel. The nail shall have ribbed threads along its shank and a conical point. It shall also have an indent in the center of its head to receive a surveyor's plumb bob. The identification tag shall be 1-1/2-in. dia. x 3/32-in. thick with a punched number for identification. The masonry nail shall be placed through the central hole in the identification tag and driven into an asphalt-covered surface such that the identification tag lies directly between the asphalt covered surface and the head of the masonry nail.

2. Vertical Monitoring Points (VMP) shall be used to monitor movements of structures, and shall consist of a 5/16 in. dia. x 4-1/2 in. long (or longer) hex bolt, ASTM A307-UNC Thread, screwed into a 1 in. long x 5/16 in. dia. tamp in screw anchor. The anchor and the casing shall meet the requirements of Federal Specification FF-S-325 Group 1, Type 1, Class 1. A 5/16 in. dia. x 3/4 in. long carriage bolt shall replace the 4-1/2 in. long (or longer) hex bolt when readings are not being taken. These tamp in screw anchors shall typically be installed into vertical surfaces of building foundations.

2.03 CRACK MONITORS

A. Provide portable comparator/reticule crack monitor system, with linear scale 0.75 in. long, graduated every 0.005 in., and a triplet lens to create a flat optical field over the entire reticule area.

2.04 OBSERVATION WELLS

A. The following materials are required for installation of an observation well:

1. Medium Sand - 3% passing 200 mesh size, Coefficient of a Uniformity = 2.5 grain size approximately 0.4 to 2mm, or standard Ottawa sand (ASTM Designation C190).

2. Slotted Pipe - 5 foot long, 2" ID, Schedule 40 threaded flush joint PVC pipe with factory cut slots between 0.01 and 0.02 inch slot width.

3. Coarse to fine Sand - 3% passing 200 mesh size, clean and well graded.

4. Riser Pipe - 2" ID Schedule 40, solid wall PVC, threaded flush joint.

5. Silt Trap - 2" ID Schedule 40, solid wall PVC, plugged at bottom.

6. Bentonite Pellets

7. A cast iron roadway valve box, 34" to 44" suitable for H-25 loading, set flush with the existing ground within paved roadway areas. A locking cap and padlock shall be installed on each monitoring well. Two (2) lock keys that open all padlocks for the project shall be given to the Engineer.

2.05 TILTMETERS

A. Tiltmeter base plates shall be: Model 50307300 by Slope Indicator Company, Mukilteo, WA 98275; Model 716-2 by Applied Geomechanics, Santa Cruz, CA 95062; Model 6201 by Geokon Inc., Lebanon, NH 03766; or approved equal. Readout units shall be compatible with the selected base plate and shall provide tilt readings to a resolution of 10 arc seconds.

2.06 INCLINOMETERS

A. Provide inclinometer casing, probe, cable, readout unit and accessories, as manufactured by Slope Indicator Co., Mukilteo, WA, or acceptable equivalent.

B. Inclinometer casing shall be 2.75 in O.D. ABS or acceptable equivalent with broached internal keyways, and twist tolerance better than one degree per 10 ft length. Couplings shall be of the non-telescoping type.

C. Probe shall be model 50302500 as manufactured by Slope Indicator Co. or acceptable equivalent. Probe shall be biaxial, consisting of two force balance accelerometers mounted at 90 degrees, with a 2 ft wheelbase. Probe shall be supplied in a carrying case.

D. Cable shall be 150 ft long, shall be sheathed with neoprene, and shall have vulcanized rubber markers, and an internal wire rope core. Minimum cable O.D. shall be 0.4 in.

E. Readout unit shall be Digitilt DataMate as manufactured by Slope Indicator Co. or acceptable equivalent. The time interval between recordings 2 ft apart in the casing shall be such that the reading stabilizes to within ±1 unit of display within 8 seconds. Readout unit shall include a battery charger.

F. Provide accessories, consisting of end caps, tools and materials for attaching couplings, and taking readings.

G. Provide inclinometer software, GTILT PLUS, Version 1.48 or later, as supplied by Mitre Software Corporation, Edmonton, Alberta, or acceptable.

H. Cement grout shall be type III Portland cement and water. Special grout Type B shall include cement and water and shall have similar strength to the concrete.

I. Surface protection shall have a diameter adequate to allow attachment of cable support assembly, or shall allow for an inclinometer casing extension while readings are being taken. The length of the inclinometer casing extension shall not vary by more than 0.05 inches.

2.07 TAPE EXTENSOMETER

A. Provide tape extensometers and carrying cases manufactured by RS Technical Instruments Ltd., Coquitlam, BC, Canada; model 51811500 as manufactured by Slope Indicator Co., Mukilteo, WA; model 1600 as manufactured by Geokon, Inc., Lebanon, NH; or approved equal. Tape length shall be 60 feet minimum.

B. Provide anchorage points from the same commercial source as the tape extensometers.

C. Provide calibration frame from the same commercial source as the tape extensometers. Calibration frame shall consist of a 5-ft length of a C6x8.2 steel channel, with a 10 inch x 6 inch x ¼ inch thick steel plate welded to the channel at each end. The channel and the plate shall be made from black A36 steel. All corners shall be rounded. Provide anchorage point fixed to each plate, with sufficient clearance above the channel to mount the tape extensometer.

2.08 SEISMOGRAPHS

A. Provide portable seismographs for monitoring the velocities of ground vibrations and air overpressure levels resulting from construction activities. Provide model MR2002 manufactured by Syscom Instruments and provided by Geocomp Corporation, 1145 Massachusetts Avenue, Boxborough, MA 01719; model SSU 2000DK as manufactured by Geosonics Inc., Warrandale, PA; model Blastmate II as manufactured by Instantel Inc., Ottawa, Ontario, Canada; model VMS-200 as manufactured by Thomas Instruments, Inc., Spofford, NH, or acceptable equivalent. The seismograph shall have the following minimum features:

1. Seismic range: 0.01 to 8 inches per second with an accuracy of 5% and no more than a 3 db roll off at the low frequency end.

2. Flat frequency response: 2 to 200 Hertz.

3. Three component sensor.

4. Two power sources: Internal rechargeable battery and charger and 115 volts AC. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.

5. Capable of internal dynamic calibration.

6. Direct writing to printer and to 3-1/2 magnetic disk. Instruments must be capable of producing strip chart recordings of readings on site within one hour of obtaining the readings. Provide computer software to perform frequency analyses of data obtained on magnetic disks.

7. Continuous monitoring mode must be capable of recording peak velocities.

8. Sound level frequency response: flat within ±3db from 2 to 200 Hz."

2.09 PORTABLE READOUT BOX

A. The Contractor shall provide one portable readout unit for the tiltmeters for the sole use of the Engineer. The Contractor shall use the same type of readout unit(s) for taking readings as specified herein. The readout unit shall consist of a lightweight, compact, waterproofed, microprocessor-controlled, readout box designed for heavy construction applications. The system shall contain at least eight kilobytes of random access memory capable of storing at least 500 recorded readings that can be scanned, deleted, or transferred to an IBM-compatible personal computer. Readings shall appear on an LCD display, and shall be legible from no less than 5 feet away. The readout unit shall store and display both vibrating wire and thermistor readings. The

unit shall be battery operated with a battery life of at least 16 hours under continuous use. The unit shall have a accuracy of 0.001%, and a resolution of 0.01 microseconds.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. All instruments shall be installed in the presence of the Engineer. Cooperate with the Engineer to allow safe access to the work area at all times for the purpose of observing instrumentation installation.

B. Contractor's Geotechnical Instrumentation Engineer shall be fully responsible for the installation, testing, calibration, reading, maintenance of the instrumentation, interpretation of the field readings and implementation of appropriate corrective measures. Verify the reliability of all installed instruments a minimum of 2 weeks prior to construction.

C. Location and arrangement of the instrumentation shall be planned so that monitoring can continue until completion. Adequate access for maintenance and reading of the instrumentation shall be provided.

D. All instruments shall be securely fixed such that they are capable of resisting movement and pressure changes underground, or vandalism and adverse climatic conditions at surface locations.

E. The Contractor shall install, monitor, and interpret data from instrumentation, in addition to that specified herein, that the Contractor deems necessary to ensure the safety of personnel and the Work, at no additional cost to the Authority. Data shall be reported to the Engineer as specified herein.

F. Maintain records relating to problems encountered, delays, unusual aspects of the installation, and details of any events that may have a bearing on instrument behavior. These records should be submitted along with monitoring data.

3.02 INSTALLATION OF INSTRUMENTS

A. Install the equipment according to the manufacturers' recommendations.

B. Testing shall be undertaken as necessary to ensure satisfactory functioning of the equipment at each stage of the installation. In particular, adequate precautions shall be taken to protect the instruments from harmful effects of groundwater.

C. Instruments found to be malfunctioning at any time shall be replaced within one week.

3.03 INSTALLATION OF DEFORMATION MONITORING POINTS

A. Deformation monitoring points (DMPs) shall be installed at the locations shown on the Contract Drawings or as directed by the Engineer.

B. After installation of a DMP, determine as-built location in horizontal position to an accuracy of +/- 0.03 ft, and in elevation to an accuracy of +/- 0.005 ft.

3.04 INSTALLATION OF CRACK MONITORS

A. Cracks to be monitored on structures shall be identified and marked clearly for identification purposes at locations determined by the pre-construction survey performed by the Contractor and as approved by the Engineer.

B. The initial reading of crack monitors where installed shall be documented and photographed with date stamped.

3.05 INSTALLATION OF OBSERVATION WELLS

A. Observation wells shall be installed in accordance with ASTM D5092.

B. Prepare logs of soil and rock encountered during drilling and show details of the installation. In soil, obtain samples with standard 2 inch O.D. split spoon or equivalent. Sample at minimum 5-foot intervals and at each change in stratification.

C. Submit the logs and samples to the Engineer.

D. Groundwater samples shall be taken by the Contractor after development of each well, unless otherwise directed by the Engineer.

3.06 INSTALLATION OF TILTMETERS

A. Tiltmeter base plates shall be installed at locations shown on the Contract Drawings with adhesives or bolts in accordance with the manufacturer's recommendations.

3.07 INSTALLATION OF INCLINOMETER

A. Inclinometer casings shall be installed at the location shown on the Contract Drawings. After installation, the casing groove spiral shall not exceed one degree per 10 ft of length, the orientation of the grooves at the top of the casing shall be within 10 degrees of the planned orientation, and no part of the casing shall deviate from vertical by more than 4 percent of the depth to that part. The bottom of the casing shall be a minimum of 15 ft within a stratum suitable for providing base fixity, such as bedrock or glacial till.

B. Three samples shall be taken of the material assumed to provide base fixity, one at the bottom of the borehole, others at 5 and 15 ft above the bottom of the borehole, and submitted to the Engineer within 24 hours. If the material is bedrock, a core sample shall be taken throughout the bottom 15 ft.

C. One set of casing grooves, defined as the A-A axis, shall be oriented perpendicular to the tunnel alignment. Inclinometer casing groove orientation shall be maintained throughout installation.

D. After completion of installation, a post-installation acceptance test shall be performed to verify that there is no grout in the inclinometer casing, that groove orientation and verticality are correct and that the inclinometer probe tracks correctly in all four orientations.

E. After completion of installation, the as-built location in horizontal position shall be determined to an accuracy of ±0.1 ft, and the elevation of the top of the inclinometer casing to an accuracy of ±0.01 ft. The point selected to determine horizontal position shall be indicated on the installation record sheet.

3.08 INSTALLATION OF TAPE EXTENSOMETER

A. Tape extensometer anchorage points shall be installed at the locations shown on the Contract Drawings or as directed by the Engineer.

B. After anchorage points are installed, record as-built locations on installation record sheets with sufficient dimensions so that they can be replaced if they are destroyed during construction.

3.09 INSTALLATION OF SEISMOGRAPHS

A. Monitoring of vibrations by seismographs shall be performed as a minimum at all locations shown on the Contract Drawings, and also on other facilities that may be affected by construction activities where the Contractor deems necessary to monitor vibration levels. At each facility, geophones shall be placed as appropriate on the ground at points between three and six feet from the faces of buildings, on the structure of buildings and on the floor slab near the closest exterior face of the buildings.

B. Geophones shall be firmly mounted on the surface slab of concrete or asphalt, firmly set in undisturbed soil, or rigidly attached to the structure of buildings and shall be left in place for a time adequate to achieve the monitoring schedule specified herein.

3.10 MAINTENANCE OF INSTRUMENTATION

A. Prevent damage to the instruments and ancillary equipment during handling, installation and subsequent operation. Maintain all the instruments required for long term monitoring in a satisfactory working order for the duration of the monitoring program. Should an instrument become damaged or become non-functional, it shall be the Contractor's responsibility to replace, within one week, the damaged instrument to the satisfaction of the Engineer at no additional cost to the MBTA.

B. Ensure that all the instrumentation in use has been correctly calibrated. Carry out periodic checks to confirm the validity of calibration of equipment in accordance with the manufacturer's instructions and carry out any adjustments that are found necessary. Suspect readings shall be repeated.

C. Keep records of all calibration certificates and, when necessary, send equipment off site for re-calibration by an independent accredited testing laboratory.

D. Record the location of all instrumentation on as-installed Working Drawings. As-installed drawings shall include the routing of all cabling. Hidden electrical instrumentation shall be identifiable by color codes and/or tagged cables. The reference coding shall also be recorded on the as-installed drawings.

E. Ensure that electrical instrumentation is not adversely affected by other temporary or permanent electrical services.

3.11 INSTRUMENT READING AND RECORDS

A. Instruments shall be read as soon as possible after installation to establish datum readings that shall be established from a minimum of two independent reading operations giving consistent results. The method of reading shall be as recommended by the manufacturer.

B. Monitoring Schedule

1. Monitor instrumentation in accordance with the schedule shown in Table 1.

2. Monitor instrumentation more frequently, if instrumentation detects significant anomalous or suddenly changing readings.

C. In the event of any change in circumstances, for example the influence of the construction of other structures nearby, the program of readings shall recommence.

D. The same recording devices shall be used at any given location through the monitoring program. If for any reason this becomes impracticable, due to instrument breakage for example, new datum readings shall be taken immediately with a replacement instrument, and the new instrument used for the future readings. Similarly, should a monitoring location become unavailable, the instrument previously read from this point shall, within one week, be read from an alternative point, the latter then being used for subsequent readings.

E. Readings shall, wherever possible, be taken by the same personnel. Should the personnel be replaced for any reason, a series of duplicate readings shall be carried out by the out-going person and the replacement.

3.12 TRACK MONITORING PROGRAM

A. Provide continuous monitoring of all tracks within 100 feet of construction activities to assure that movements do not exceed the tolerances specified herein at any time during construction. Provide all survey data in reduced form to the Owner in order that any required track adjustments can be made by Authority field crews. All costs associated with monitoring and any track adjustments shall be borne by the Contractor with no compensation by the Owner.

B. Track Tolerances

1. Horizontal Track Alignment . . . . . $\pm$ 0.20-inch

2. Vertical Track Profile . . . . . $\pm$ 0.10-inch

3.13 LIMITING INSTRUMENTATION READINGS

A. The Contractor shall perform all work in a manner to prevent instrumentation readings from exceeding limiting values specified in Table 2. Where the Contractor's operations result in instrumentation readings approaching the limiting values in Table 2, the Contractor shall modify

his means and methods so that the work may be accomplished without exceeding the limiting values. Any delays or modifications to the Contractor's means and methods shall be at no additional cost to the MBTA.

3.14 DATA REDUCTION, PROCESSING, PLOTTING AND REPORTING

A. The Contractor's instrumentation personnel and surveyors shall reduce, process, plot, and report data from the Contractor's monitoring program.

B. Each week the Contractor shall submit to the Engineer a weekly data report together with all new data on magnetic disk, as specified herein. The weekly data report shall be bound and indexed and shall include:

1. A section for each type of instrument. This section shall include: a brief description of the cumulative changes in instrument readings, a brief description of the changes in readings from the previous weekly data report, a table summarizing instruments, actual readings, and if any limiting readings have been reached. Raw and reduced data collected during the week, on summary tables (8-1/2in. x 11in. sheets of paper). Plots of data versus time and including key construction activities and other events that could influence changes in the data shall be shown. Plots of like instruments shall be done at the same scale to facilitate graphical comparison.

2. A description of work being performed during the week by the Contractor and any possible activity in the area that may have an effect on instrument readings. Describe groundwater control and temporary relief operations, including pump locations, times of operation, and estimated quantity of flow.

C. Plots of seismograph data shall be in the form of strip charts. Strip charts shall be used to monitor continuously and record peak particle velocities produced each minute of continuous vibration producing activity as defined in Table 1. Contractor shall provide the following data:

1. A permanent record of peak particle velocity for each minute from the specific start to finish time specified in Table 1. This permanent record shall be in the form of a scaled histogram strip chart printed or photocopied onto 8-1/2 in. x 11 in. non-fading paper. The strip chart should also indicate the time and magnitude of maximum peak particle velocity measured during each one-hour interval of the monitoring period.

2. A tabular summary report printed on 8-1/2 in. x 11 in. paper summarizing the maximum peak particle velocity measured during each hour of monitoring.

3. An IBM PC-Compatible data diskette containing all maximum peak particle velocity data, and compatible manufacturer's software required to read and analyze the data."

3.15 DAMAGE TO INSTRUMENTATION

A. The Contractor shall protect all instruments and appurtenant fixtures, leads, connections, and other components of instrumentation systems from damage due to construction operations, weather, traffic, and vandalism.

B. If an instrument is damaged or inoperative, including an existing instrument installed by others, the Contractor's instrumentation personnel shall repair or replace the damaged or inoperative instrument within 72 hours, at no additional cost to the MBTA. The Engineer will be the sole judge of whether repair or replacement is required. The Engineer may impose a work stoppage in the vicinity of the damaged or inoperative instrument until it is again operational, at no additional cost to the MBTA.

C. Contractor shall repair or replace at its own cost any of the readout devices used for the Contractor's monitoring program that become damaged, inoperative, or, in the judgment of the Engineer, unreliable.

3.16 REMOVAL OF INSTRUMENTS

A. Prior to completion of the Contract, remove all instrumentation installed under this Contract. Protect and maintain all instrumentation until such time as written approval authorizing removal of instrumentation has been received from the Engineer.

B. Removal of instruments shall include removing and disposing of protective covers, recovery of salvageable portions of instrumentation and grouting of casings.

C. All instruments or portions thereof removed by the Contractor shall remain the property of the Contractor.

D. Instrumentation readout and calibration equipment purchased under this Contract shall become the property of the MBTA.

E. Remove the instrumentation specified herein as directed by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Furnishing and installation of instruments will be measured as follows:

1. Measurement of payment of Deformation Monitoring Points will be made for each complete installation.

2. Measurement of payment of Crack Monitors will be made for each complete installation.

3. Measurement for payment for observation wells will be made for the number of vertical feet of well installed in accordance with the Observation Well Detail shown on the Contract Drawings from the tip of the well screen to the ground surface, including the protective cover.

4. Measurement of payment of tiltmeters will be made for each complete installation and shall include the cost of the portable readout box.

5. Measurement for payment for Inclinometers will be made for the number of vertical feet of Inclinometer installed in accordance with the Inclinometer Detail shown on the Contract Drawings from the tip of the PVC casing to the ground surface, including the protective cover.

6. Measurement for payment for Tape Extensometers will be made for the number of pairs of tape extensometer anchors installed and shall include all equipment necessary to obtain readings.

7. Measurement of payment of Seismograph Equipment will be made for each complete installation and shall include all equipment necessary to obtain readings.

B. Surveying, protecting, reading, reporting and maintaining instrumentation for the Geotech. Monitoring Program will be measured on a lump sum basis.

4.02 PAYMENT

A. Surface Settlement Points will be paid for at the Contract unit price for the quantity determined as specified above.

B. Vertical Monitoring Points will be paid for at the Contract unit price for the quantity determined as specified above.

C. Crack Monitors will be paid for as Surface Targets at the Contract unit price for the quantity determined as specified above.

D. Observation Wells shall be paid for at the Contract unit price per liner foot determined as specified above.

E. Tiltmeters shall be paid for as Tilt Plates at the Contract unit price for the quantity determined as specified above.

F. Inclinometers shall be paid for at the Contract unit price per liner foot determined as specified above.

G. Tape Extensometers shall be paid for as Horizontal Tape Extensometer Anchors at the Contract unit price per pair for the quantity determined as specified above.

H. Seismograph Equipment shall be paid for at the Contract unit price for the quantity determined as specified above.

I. The lump sum price bid for the Geotech. Monitoring Program shall include for all costs necessary to perform the work including surveying, protecting, reading, reporting, maintaining and removing instrumentation, and performing the Track Monitoring Program.

Item No.	Payment Item	Unit
0120.305	SURFACE SETTLEMENT POINT	EA
0120.178	VERTICAL MONITORING POINT	EA
0120.410	SURFACE TARGETS	EA
0120.490	OBSERVATION WELL	LF
0120.169	TILT PLATES	EA
0120.192	INCLINOMETER	LF
0120.185	HORIZONTAL TAPE EXTENSOMETER ANCHORS	PR
0120.351	SEISMOGRAPH EQUIPMENT	EA
0120.233	GEOTECH. MONITORING PROGRAM	LS

TABLE 1 - MONITORING SCHEDULE

INSTRUMENT	SCHEDULE
All Instruments	(1) One reading immediately after installation. (2) One reading each workday until, as determined by the Engineer, repeatability indicates that any data changes resulting from the installation process have ceased. (3) Formal initial reading. (4) One reading immediately prior to any construction of the associated facility. Thereafter, reading frequency shall follow the schedule given below.
Railroad Track Monitoring Points	Within one hundred feet of excavation, one reading daily or every three (3) feet of completed excavation, whichever is more frequent. Readings shall be taken more frequently if limiting values are exceeded. After backfilling to finished grade, readings shall be taken weekly for two weeks, and one final reading shall be taken prior to the end of the Contract.
Crack Monitor	One reading every five (5) feet of completed excavation or every week, whichever is more frequent, until excavation has reached full depth. Readings shall be taken once daily if limiting values are exceeded and until the readings have equilibrated to the satisfaction of the Engineer. Readings will continue to be taken weekly until the end of any support of excavation installation within 100 feet of the instrument and backfilling of the excavation. Thereafter, monthly readings shall be taken until completion of the construction contract.
Observation Wells	One reading every day during dewatering operations. Readings will continue to be taken weekly after dewatering operations have been completed for two weeks.
Structural Deformation Monitoring Points and Tiltmeters	One reading every five (5) feet of completed excavation or every week, whichever is more frequent, until excavation has reached full depth. Readings shall be taken once daily if limiting values are exceeded and until the readings have equilibrated to the satisfaction of the Engineer. Readings will continue to be taken weekly until the end of any support of excavation installation within 100 feet of the instrument and backfilling of the excavation. Thereafter, monthly readings shall be taken until completion of the construction contract.
Inclinometer	One reading every day while excavation is open. Readings will continue to be taken weekly for one month after excavation has been completed.
Tape Extensometer	One reading every day while excavation is open. One reading every day while internal struts are loaded during demolition and construction. Readings will continue to be taken weekly for one month after excavation and construction has been completed.

INSTRUMENT	SCHEDULE
Seismographs	Formal initial background seismograph readings shall be taken prior to the beginning of excavation, installation of excavation support, compaction, or other vibration-producing construction activity. Initial readings on facilities shall consist of a minimum of 24 hours of continuous monitoring of peak particle velocities, which shall be printed to a strip chart. During this period, particle velocities shall be read with a minimum sensitivity of 0.002 in./sec. Prior to the beginning of a vibration-producing construction activity within 100 feet of a vibration monitoring location, determine peak particle velocity and corresponding frequencies, (i.e. full wave form data, produced by individual or discrete events caused by vibration-producing activities) to establish the maximum energy which can be used without surpassing acceptable vibration levels as specified in Table 2. During vibration-producing construction activity, record vibrations continuously with the threshold trigger level of the seismograph set at 50% of the limit specified in Table 2. Monitoring shall continue until completion of the construction activity or until the Contractor has demonstrated to the satisfaction of the Engineer, that the construction activity will not exceed the limits specified in Table 2. Monitoring and full wave form data shall be recorded and submitted.

TABLE 2 - LIMITING INSTRUMENTATION READINGS

INSTRUMENT	LIMITING VALUE
Railroad monitoring points	Horizontal ± 0.2 inches; Vertical ± 0.1 inch
Structural Deformation Monitoring Points and Tiltmeters	0.5 inch
Crack Monitor	None (1)
Observation Wells	
Inclinometer	0.5 inch
Tape Extensometer	0.25 inch
Seismograph	See Table 3

TABLE 2 NOTES:

1. Crack monitor data shall be evaluated by the Contractor in conjunction with DMP data.

TABLE 3 - RESPONSE VALUES
VIBRATION ACCEPTANCE CRITERIA WITH SEISMOGRAPHS

RESPONSE VALUES FOR ALL SEISMOGRAPHS

STRUCTURAL CATEGORY	f(Hz)	PEAK PARTICLE VELOCITY (ppv) Limiting Value (in/sec)
I	1-30	0.5
	30-60	0.5-0.7*
II	1-30	0.3
	30-60	0.3-0.5*
III	1-30	0.2
	30-60	0.2-0.3*
IV	1-30	0.12
	30-60	0.12-0.2*

NOTES:

1. Limiting Value: (*) the lower value applies to 30 Hz, the upper to 60 Hz, with interpolation in between.

2. Vibration acceptance criteria for building based on Swiss Standard SN640312. This standard allows acceptance criteria according to building type and the frequency and type of expected construction related vibrations. For the purpose of this Project, the acceptance criteria of the Swiss Standard were converted to English units (inches per second), and are incorporated in this table.

3. f(Hz) = frequency in hertz.

4. Strict vibration thresholds and limits have been established for buildings in the vicinity of the construction. The Contractor is advised that due to the close proximity of the construction to some of these buildings, construction means and methods may need to be altered or restricted to operate within the range of vibration established.

5. Response values for airblast overpressure are based on peak airblast levels with a 2-Hz descriptor, as recommended by the U.S. Bureau of Mines.

6. Structural Category Definitions:

Location	Structural Category
All Maverick Square Buildings (North of Sumner Street)	III
MBTA Station Structure	II
Boston Housing Authority Buildings (South of Sumner Street)	I

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies demolition in accordance with Section 02050 of the Standard Specifications except as modified in the Contract Documents and as specified herein.

D. Work Included: All demolition and/or removal of work, as indicated on the drawings, including the following:

1. Demolition work at Unit Substation B2 shall include removal of cast-in-place concrete end wall of existing electric room along with stair and landing at north side as indicated on drawings. On the south and west walls, saw-cutting of the existing cast-in-place wall shall be performed for new door openings. The 10 foot and 8 foot existing roll-up doors on the north walls shall be removed, salvaged, refurbished, including rewiring, and reinstalled at the locations shown on the drawings. The existing roll-up door frames shall not be salvaged and new frames shall be provided at new door locations. In addition, the salvaged doors shall be painted and the moving parts shall be greased. The existing motor for the 10 foot roll-up door shall be replaced with a new one. Openings resulting from the removal of existing doors shall be blocked with CMU. In addition, demolition work at Unit Substation B2 shall include all saw-cutting of the existing concrete walls at Vent Shaft B5 required for new ductwork and the removal of debris at Vent Shaft B5.

2. Demolition work at Vent Shaft B3, located at the abandoned turnaround loop north of Maverick Station shall include but is not limited to: removal of the 6" drainpipe and sealing the remaining opening, removal of all abandoned DC lighting and conduit, removal of existing lighting within the area of the new fan room and exhaust plenum, removal of tunnel ballast and debris within the limits of the new fan room and adjacent track areas and relocation of the signal, signal power and communication cables. Cables shall be enclosed in a new cable tray supported from the tunnel wall.

3. Demolition work at the station shall include all demolition work shown on the constructions drawings including removal of all existing station elements, removal of existing vent structure and Siamese standpipe connections, removal of existing columns, removal of tunnel floor slab, removal of existing emergency egress stairs, removal of walls and tunnel, removal of existing fare and ticket booth, removal of existing escalator and stairs, removal of existing hatch, and removal of the existing communication room.

4. This Section does not cover the removal or disposal of asbestos or lead based paint. The removal and disposal of these materials shall be conducted in accordance with Sections 02080 and 02090, respectively.

E. Related Work Specified Elsewhere:

1. Refer to Division 02, SITEWORK for further requirements.
2. For mechanical demolition and/or removal, see Division 15;
3. For electrical demolition and/or removal, see Division 16.
4. The removal, transportation, and disposal of oil and/or hazardous materials shall be conducted in accordance with Section 02082.
5. The field screening, stockpiling, segregating, tracking, transporting, and disposing of excavated soils shall be conducted in accordance with Section 02081.
6. The removal, transportation, and disposal of aboveground storage tanks (ASTs) shall be conducted in accordance with 02083.
7. Relocation of dry standpipe in accordance with Section 15500.
8. Geotechnical Instrumentation in accordance with Section 02010
9. Support of Excavation in accordance with Section 02295
10. Dewatering in accordance with Section 02090
11. Dust Control in accordance with Section 01562

F. Definitions

1. Temporary shoring, bracing and support of structures shall be what is required to support the existing structure or permanent structure during construction, but not required in the completed structure. Upon completion, all temporary work shall be removed unless otherwise directed or required.

2. Alterations shall include temporary relocations and construction as required.

G. Responsibility and Intent

1. It is the intent of this Section of the Specification to obtain a complete, finished installation insofar as the alterations and demolition to the existing facility is concerned. The Contractor shall inspect areas affected and carefully check the Drawings to ascertain all of the required work therein.

2. Each trade shall do his own cutting and rough patching, removing, relocation, fitting and altering as required for the installation and completion of his work. Finish patching shall be by the trade that normally performs the finish work.

H. Advisory

1. The Contractor is advised that preliminary sampling activities indicate that the concrete slab located within the project area may be coated with a petroleum-based waterproofing material (See ATC Associates Inc. report Soil Sampling Results – Maverick Station dated July 14, 2003). If encountered, these materials should be sampled, handled, and disposed of in accordance with Sections 02080 and 02082. The Contractor is responsible for sampling and characterizing waterproofing material to confirm it meets the requirements of the selected disposal facility.

2. Due to the close proximity of the MBTA blueline tracks, significant portions of the demolition work may be required to be performed during non revenue hours.

1.02 SUBMITTALS

E. Proposed Demolition and Alterations Methods: the Contractor shall submit for review and approval proposed materials and installation schedules and demolition methods described in detail including, but not limited to the following:

1. Show proposed schedule, methods and operations of demolition work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required. Indicate the coordination of demolition operations with transit operations. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Authority's operations and indicate relationship to the overall project construction sequence.

2. Show proposed method of temporary alterations, shoring, bracing, and support of structures. A registered professional engineer licensed in the Commonwealth of Massachusetts shall certify the Shop Drawings. Include details indicating sizes and shapes of girders, beams, connections to structure support system, and methods of assembly and bracing. Show species and grades of lumber and the applicable government and industry standards and specifications for other materials to be used. Show loadings, allowable stresses and other criteria used in the design including the most severe loading condition to which the support system will be subjected. Calculations and Drawings stamped by the professional engineer shall be submitted to Engineer for review.

F Pre-Demolition Survey:

1. The Contractor shall conduct a pre-demolition survey of station. All pipes, wiring, conduits, utilities, and drainage structures shall be located, labeled and recorded on a master station plan. This plan shall be submitted to the Engineer for approval before beginning any demolition.

1.03 JOB CONDITIONS

F. Occupancy and Use: The Authority will operate as normal during the entire demolition period. (See the proposed Construction Sequence Drawings for North and South Head house usage.)

G. Condition of Structures: The Authority assumes no responsibility for the actual condition of structures to be demolished. Conditions existing at the time of inspection for bidding purposes will be maintained by the Authority in so far as practicable. However, variations within the structure may occur by Authority's removal and salvage operations prior to the start of the demolition work.

H. Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having Jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

2. Do not foul track ballast with debris of any kind. Provide all necessary protections.

I. Damages: Promptly repair damages caused to adjacent facilities by demolition operations, as directed by the Engineer and at no cost to the Authority.

J. Utility Services: Maintain existing utilities and protect against damage during demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the governing authorities.

K. Protections: Provide covered passageways to ensure the safe passage of persons and transit facilities around the area of demolition. Conduct operations to prevent damage by falling debris or other cause to adjacent buildings, structures, and other facilities as well as persons.

1. Provide interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain.

L. Partial Removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses. Salvaged items must be transported from the site as they are removed. Storage or sale of removed items on the site will not be permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Unless otherwise specified below or indicated, it is intended that new materials be furnished, however if during the progress of the work it is found that present materials are sound, of proper quality and dimensions as required by the Contract Documents, the contractor may request permission to use same stating the proper allowance to be made to the Authority. Should same be approved by the Engineer, a Change Order shall be executed in accordance with the General Conditions.

PART 3 - EXECUTION

3.03 GENERAL

A. The existing work required to be removed shall be as indicated on the Drawings, but shall also include any and all other existing materials or work necessary to install the new work as shown and specified and to connect same with existing work as approved.

B. Except where indicated on the Drawings, specified, or directed to be reused or retained by the Authority, all demolished materials, etc., shall become the property of the Contractor and shall be legally and promptly disposed of off site.

C. Demolition shall conform to all municipal codes, laws, rulings and the requirements of all bodies having jurisdiction. Execute all work in a careful and orderly manner with the least possible disturbance to the Authority.

D. Sprinkle debris with water to prevent annoyance from dust. Where practicable, employ enclosed chutes or container carts to convey debris to street level.

E. Remove portions of existing slabs, beams, walls, partitions and the like; cut openings in slabs, beams, partitions for new chases, doors, equipment, beams, etc.; do all cutting and removals of existing work otherwise required by the Drawings and the specifications, or as may be required for the proper installation of the new work. All cutting or coring of structural elements shall be done under supervision of the Engineer.

F. The premises shall not be used as a workshop to the detriment of any portion thereof. Should any damage occur during the progress of the work to any part of portion of the present building or to fixtures or furnishings or any part or portion of thereof during operation, said damage shall be promptly repaired and made good without extra charge through supply of new materials, etc. or otherwise as may be required to leave the plant in perfect order at the completion of all work.

G. Do not begin work until Shop Drawings and schedules showing the manner and methods proposed for the demolition work have been given approval by the Engineer. Where temporary shields and partitions are required they must be completely installed and approved by the Engineer before the demolition work is started. Where erection of shields or partitions or performance of other work adjacent to, under, or over the tracks of the existing subway would cause interference with the safe and continuous operations of the Authority's trains or with the business of the Authority, or would cause interference with passengers, intending passengers and employees of the Authority, it will be necessary to perform such work during hours when the Authority's trains do not operate.

H. Furnish and erect temporary partitions from floors to underside of structure above, in sash and any other openings created by new construction, additions and alterations. Such partitions shall be constructed dust-tight and shall be located as directed by the Engineer and/or as shown on the drawings. Keep all doors to spaces closed and provide positive seals around cracks, reframes, doors and other openings within work areas.

I. The work of this section shall not interfere, but shall be coordinated with the normal operation of the Authority. Unnecessary disturbances, noise and the like will not be tolerated.

3.04 DETAILS OF DEMOLITION

A. General: Do work in an orderly, careful manner so as to protect existing work and to preserve the materials remaining to facilitate subsequent patching and finishing. At no extra expense to the Authority, repair to the satisfaction of the Engineer any portion of the existing structure which is to remain that is damaged by these operations.

B. Temporary Bracing and Shoring: Provide where required and arrange so that no excessive load will be transferred to any portion of the existing structure to remain so as to avoid the possibility of its cracking, deflection, deformation or collapse.

C. Concrete and Masonry: Demolish in small sections. Where portions of masonry are to remain in place, saw cut a straight edge and take care not to overcut the portions to be

removed. Burn-off existing reinforcement or, where indicated to remain, remove carefully the encasing concrete. Where the dowels are indicated for joining new work with existing work, drill the existing concrete as indicated to receive same. Leave concrete to remain in place and to be joined with new work clean with all loose and foreign materials removed.

D. Structural Steel: Where structural steel to be removed cannot be removed at connections, it may generally be removed by flame cutting methods except where steel which is to remain in the structure might be damaged either in strength or appearance by the flame. In such cases, remove by sawing or other approved method as directed. Where new steel is to be connected to existing steel, clean thoroughly the surfaces of the existing steel. Fill unused holes by plug welding.

3.05 TEMPORARY SHIELDS AND PARTITIONS

A. Provide temporary overhead shields and wall partitions where required to maintain station operations and as directed by the Engineer.

B. Provide all materials, labor and equipment necessary to furnish, deliver and install all temporary new work as indicated or specified, generally as follows:

1. Re-routing of all pipes, ducts, conduits, wiring, and the like to provide continuous services during demolition and construction.

2. Temporary barricades, dustproof partitions, all facilities, services in connection with alterations to existing building all in accordance with the terms and conditions specified herein and in the Supplementary General Conditions and Division 01 Specifications.

3. All other temporary new work reasonably inferred as needed to complete the work of this project.

4. Removal of all temporary new work upon completion or as directed when no longer needed.

5. Maintenance and protection of existing equipment and facilities during all alterations and demolition.

6. Protection of communications network during alterations.

7. Protection of existing mechanical equipment during new work.

8. Scheduling, covering and protection of existing work in or below new construction and elsewhere required by the alterations.

9. Protection of existing work designated to remain.

10. Maintenance of safety and egress requirements from work areas.

11. Temporary Exit Systems.

13. Temporary roof protection.

C. Provide temporary overhead shields and wall partitions where required to maintain subway operations and as directed by the Engineer. Constructed temporary shields and partitions of structurally sound lumber or steel, covered with plywood or hardboard or metal sheets and erected on the inside of the portion of the existing structure to be demolished and so as to provide the clearances indicated or established by the Engineer. Provide temporary structures of adequate strength for the purpose intended, be responsible for their strength and safety and maintain them in a condition satisfactory to the Engineer. Erect from wall to wall and floor to ceiling and be so constructed as to provide security for the existing facility and to provide an effective dust-proof barrier. Do not remove until so permitted by the Engineer.

3.06 PROTECTION

A. Provide protection of persons, equipment, and existing work to be left in place throughout the demolition work. Proceed in such a manner as to minimize dust and flying particles and provide safe working conditions for personnel. Sprinkle all rubbish, dirt, debris or waste with water to the extent necessary to minimize dust and remove from the site daily.

B. Water with debris and concrete dust shall not be allowed in the MBTA track beds nor ballast.

3.07 CUTTING AND PATCHING

A. Core drilling shall be used for cutting of new openings in structural floor slabs. All such required openings and their locations relative to structural elements shall be noted on shop Drawings and be approved by the Engineer.

B. All cutting and coring to be by drilling; NO JACK-HAMMERING will be permitted in the work. Cut round holes up to 16 inch diameter by coring. Rectangular holes cut by coring and sawing with a masonry saw. NO OVERCUTTING PERMITTED.

C. Patch all overcutting of the existing structure at locations where new work is to be connected to it and all overcutting at any openings to be left in the existing structure, at no extra cost to the Authority, to neat, true lines and so as to match the existing contiguous areas, using materials specified for new work or as specified herein.

3.08 CLEAN-UP

A. After completion of demolition work in each area, clean the areas and leave in clean, neat and orderly condition satisfactory to the Engineer.

3.09 RELOCATION AND PROTECTION OF SIGNAL COMMUNICATION CABLES

All signal and communication cables and associated equipment must be relocated and/or protected before any demolition in the vicinity can be performed. In the event that any signal or communication cable or apparatus require relocation, the Contractor must provide a qualified Signal Engineer to develop procedures and data collection forms prior to such

activities. The methods of protection or relocation for all signal apparatus along with the qualified Signal Engineer's resume must be submitted to the Signal Division for review and approval prior to implementation of the aforementioned. The Signal Division must be notified 72 hours prior to any excavation that will be conducted within the construction area.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0211.000	Demolition	Lump Sum

- END OF SECTION -

SECTION 02080

ASBESTOS REMOVAL

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section specifies all labor, materials, equipment, services, employee training and testing, permits, waste transportation and disposal (at an approved landfill) required for the removal of all asbestos-containing materials at the MBTA Blue Line Maverick Station in East Boston, Massachusetts. All work is to be performed in accordance with these Specifications; EPA, OSHA, and State of Massachusetts DEP and DLWD regulations; and all other applicable federal, state and local regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable. See Paragraph 1.16 of this Section for Special Considerations.

B. The Contractor shall provide all labor, materials and services to perform all the work specified in this Section, including but not limited to the following:

1. Install a temporary power distribution and lighting network. Contractor shall provide water by bringing on-site sufficient water or make arrangements to use existing water utilities. The Contractor shall provide connection from the local power utility lines and provide an auxiliary generator where needed. The Contractor shall provide ground-fault interrupt panel boards where needed.

2. Isolate each work area with air-tight barriers, and erect temporary staging, containment barriers, Decontamination Facilities (DFs) and waste transfer chambers as required to perform the work. Install HEPA filtered negative air units to exhaust the work area. Contractor shall arrange for HEPA units to exhaust outside the facility.

3. Remove all asbestos-containing material (ACM) including, but not limited to hard fittings on fiberglass pipes, 9"x9" vinyl floor tiles (VFT), pipe insulation, pipe insulation debris, paper backing in junction boxes, suspect ACM, ACM discovered during demolition, and other asbestos-containing materials indicated in the Specifications and/or as otherwise found at the site during the project. Demolish equipment and building components as required to access and completely remove all ACM at the site.

4. Demolish walls, ceilings and other equipment, etc. to access and remove all known/indicated/suspected/hidden ACM. Perform all other selective demolition as required herein or as is otherwise needed to locate, identify and remove hidden suspect ACM at the site.

5. Package all asbestos waste for disposal and transport waste to an approved landfill.

6. Thoroughly clean each work area and obtain final visual inspection and approval from the Subconsultant (including "clean air" tests by NIOSH Method 7400).

7. Perform all other work noted in the Specifications, directed by Subconsultant, or as otherwise necessary to remove all dust, debris and ACM. Perform selective demolition as needed to access and remove hidden ACM. Also see and perform all work as per Paragraph 1.16 Special Considerations.

8. Suspect asbestos-containing materials located inside and outside the building include, but are not limited to, built-up roofing products, roof flashing, electrical wiring wrap, waterproofing, and fire door core insulation, and are to be sampled by the Contractor where required herein.

C. It is the intent of this Specification that the Contractor remove all asbestos containing materials from the entire MBTA Blue Line Maverick Station wherever and in whatever form it exists. Inaccessible ACM shall be located by selective demolition and removed. ACM such as exterior roofing materials will remain in place while abatement is proceeding inside the building (except where their removal may be otherwise needed to perform the Work). All means and methods intended by the Contractor to accomplish the work are subject to the review and acceptance of the Subconsultant. The Contractor shall prepare and submit a detailed work plan for the removal of all asbestos-containing materials prior to on-site mobilization. The work plan shall be acceptable to the Authority and the Subconsultant. No additional compensation will be made if the quantities or conditions found vary from that indicated in the Specifications, except where provided for in this Section. The submission the ACM Work Plan must be submitted prior to the submittal of the Soil Management and Disposal Plan, as required by Section 02081.

The following is a summary of the work items to be performed under the Contract. Given quantities are estimates only and are not guaranteed. The Asbestos Abatement Contractor is required to remove all asbestos-containing material (and specified non-asbestos-containing materials) from the areas indicated and referenced in this section. This data is provided for informational purposes only, and is based on the best information available at the time the Contract Documents were prepared. Nothing in this section may be interpreted as limiting the scope of work otherwise required by this contract and related documents. Bidders shall not use these estimates as the only basis for their Bid. Bidders shall confirm all quantities and items during the Pre-Bid walkthrough to the extent reasonably possible. The Bidders are responsible to review and confirm all quantities and field conditions (including structural integrity of walking/working surfaces), including locations of all ACM and debris, surface area, lengths, widths, cross-sections, thickness, composition of layers, substrate composition and any attachments thereto, including glue, mastic, compounds, prior to the submission of bids. Neither the Subconsultant nor MBTA will be responsible for errors or omissions and/or charges for extra work arising from any bidders failure to become familiar with the existing conditions of the site conditions, requirements of the work and the results to be produced. By submitting a Bid, the Bidder further agrees that the descriptions contained herein and on the drawings (i.e., quantities, descriptions, locations, areas, thicknesses, etc.) are adequate and that the bidder will produce the required results (i.e., remove all ACM found at the site). No claims for extra payment due to incorrect quantities will be considered. By submitting a bid, a bidder agrees and warrants that he is familiar with and will perform all the work required in the Specifications. The estimates of asbestos containing materials and approximate quantities

of asbestos containing materials to be removed under the base Bid are in the following table.

Base Bid Asbestos Removal:

Asbestos Material Description	Location	Approximate Quantity
9" x 9" Black VFT	Track Walkers Room	250 SF
Paper Backing (within junction box)	Old Relay/Locker Room	10 SF
	Old Communications Room	10 SF
	Inspector's Room	10 SF
	Platform Area	20 SF
Pipe Insulation	Abandoned Platform Area	30 LF
Pipe Insulation Debris	Abandoned Platform Area	10 SF
Roof Flashing/Caulking	North Headhouse Roof – Perimeter and penetrations	1,000 SF

Additional Suspect Materials:

The following is the approximate location and quantities of suspect (electrical wiring wrap, fire door cores, and waterproofing) asbestos-containing materials to be removed from the MBTA Blue Line Maverick Station in accordance with this Section, provided the materials are verified to contain asbestos upon sampling as described herein:

Material	Location	Approximate Quantity
Electrical Wiring Wrap (bundled)	Throughout	5,000 LF
Fire Door Cores	Throughout	15 each
Waterproofing	On Exterior of Tunnel	10,000 SF

The Asbestos Contractor is responsible for sampling the above referenced materials (suspect asbestos-containing materials) described above at its own expense. Prior to sampling the referenced materials for asbestos content determination, the Asbestos Contractor shall coordinate sample locations with the Asbestos Consultant. All sample locations must be acceptable to the Asbestos Consultant and the Asbestos Consultant must be present while the samples are being collected. For electrical wiring wrap, fire door cores, PLM sampling shall be used. For waterproofing, TEM sampling shall be used. All samples collected outside the presence of the Asbestos Consultant shall be considered null and void and additional sampling will be required under above said conditions. All sampling shall be conducted in accordance with applicable local, state, and federal regulations, and must meet the requirements of the chosen disposal facility. The Asbestos Contractor is responsible for additional sampling should it be required by the Authority or chosen disposal facility in order to comply with applicable regulations. Provisions for the excavation of soils to expose waterproofing are not included in this section. Asbestos contaminated soils, if encountered, shall be handled in accordance with the provisions of this section.

The Asbestos Contractor shall note that the waterproofing material coating concrete materials planned for removal requires sampling prior to demolition. The Asbestos Contractor shall access and sample waterproofing materials at a sufficient number to satisfy local, state, and federal regulations. In addition, sufficient samples shall be collected to satisfy the requirements of disposal facilities that may be utilized for the project. Results of the sampling of the waterproofing and additional suspect materials shall be included in the Work Plan for

the project, which shall be required for submittal prior to the submittal of the Soil Management and Disposal Plan, as required by Section 02081

D. After all indicated ACM have been removed, perform any exploratory demolition of building components and equipment as directed by the Subconsultant to confirm that all asbestos materials have been identified and removed. ACM found as a result of this exploratory process shall be properly removed and disposed in accordance with this Section.

E. The Contractor shall not adversely impact the structural integrity of the Facility during the asbestos abatement process including but not limited to structural supports within the building, roofs, etc.

F. The following is an outline of work requirements and sequencing that provides a minimum level of detail for the overall abatement scope/sequence, and is expected to be adhered to by Contractor, except where otherwise stated in the Contractor's Work Plan. The projected sequence of work in the main asbestos work area(s) that would be acceptable to the Subconsultant and Authority is as follows:

1. Work Area Preparation and Pre-Cleaning

   Decontamination units and negative air units will be installed as needed to support the work. Water sources will be identified and utilized or off-site sources of water will be utilized. Electrical power distribution will be provided as needed including transformers and power panels. Walkways shall be maintained clear of debris at all times.

2. Scaffolding/Staging

   During work area preparation and as needed throughout the project, OSHA approved ladders and scaffolding/staging shall be installed where needed to perform the work.

3. Gross Asbestos Removal

   Asbestos and debris on pipes, floors, etc. throughout the work area will be adequately wetted, removed and properly packaged in DEP approved containers (including bulk loads where applicable) and disposed as asbestos waste (as a minimum). Waste packages will be properly labeled for asbestos waste and marked with generator labels.

4. Decontamination and Wash down/Fine Cleaning

   All surfaces shall be cleaned using water, controlled pressure washing, sponges, rags, tools, etc. needed to remove all traces of visible debris, controlling the use of the water as practical. Controlled usage of water includes containment of the water, avoidance of water streaming/splashing. Contractor shall assure that all asbestos is maintained adequately wetted throughout the removal and disposal process.

5. Final Visual Inspection and Air Clearance

   The Subconsultant or Subconsultant 's representative will perform a final visual

inspection of the work area(s). The Contractor shall re-clean the work area(s) as needed until no visible debris remains. Once the area has been accepted by the Subconsultant, final air clearance testing shall be performed.

1.02 AUTHORITY TO STOP WORK

A. The Subconsultant has the authority to stop the abatement work at any time the Subconsultant determines that conditions are not in accordance with the Specifications and applicable regulations. The stoppage of work shall continue until conditions have been corrected and corrective steps have been taken to the satisfaction of the Subconsultant Standby time required to resolve violations and Specification interpretations or contractual obligations shall be at the Contractor's expense.

1.03 DEFINITIONS

A. The following terms are defined in the specific context of asbestos removal as addressed by this Section:

1. Abatement: Any activity which has as its principal purpose the removal, enclosure or encapsulation of asbestos.

2. Accessible: Any item (including ACM) or surface that can be reached by hand, provided sufficient ladders, lifts, safety lines, shoring, scaffolding and/or staging are installed to reach such item/surface, without performing any demolition of existing structures/items in order to reach such item/surface.

3. ACGIH: American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Building D-5, Cincinnati, Ohio 45211

4. AIHA: American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311

5. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways separated by a distance of at least 3 feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

6. Air Monitoring: The process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure normally utilized for asbestos monitoring follow the NIOSH Method 7400 with analysis by Phase Contrast Microscopy and/or the Transmission Electron Microscopy method.

7. Asbestos Project Monitor: The MDLWD licensed professional contracted or employed by the Authority to supervise and conduct air sampling and monitor asbestos abatement activities.

8. Amended Water: Water to which a wetting agent has been added.

9. Asbestos: The asbestiform varieties of chrysotile, amosite, crocidolite, tremolite, anthophylite, and actinolite.

10. Asbestos Containing Material (ACM): Any material containing equal to or more than one percent asbestos.

11. Asbestos-Contaminated Objects/Surfaces: Shall mean any objects/surfaces that may be contaminated by asbestos or asbestos-containing material or water.

12. Asbestos Containing Waste: Asbestos containing material or asbestos contaminated objects requiring disposal as asbestos.

13. Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.

14. Class I asbestos work: Activities involving the removal of thermal system insulation, surfacing insulation and Presumed Asbestos Containing Materials.

15. Class II asbestos work: Activities involving the removal of ACM that is not thermal system insulation or surfacing material. This includes, but is not limited to the removal of asbestos containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

16. Clean Room: An uncontaminated area or room which is a part of the worker decontamination enclosure system with provisions for storage of worker's street clothes and clean protective equipment.

17. Competent Person: In addition to the definition in 29 CFR 1926.32(f), an individual who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take corrective measures to eliminate them. In addition, for Class I and II work, this individual must be trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for Project Designer or Supervisor, or its equivalent.

18. Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing two overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. Other effective designs are permissible.

19. Decontamination Enclosure System: A series of connected rooms separated from the work area and from each other by airlocks and used for the decontamination of workers and equipment.

20. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations.

21. Disposal Bag: 6-mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site. Each bag shall be labeled in accordance with EPA's NESHAPS, OSHA and DOT regulations.

22. Encapsulation: The application of a coating or liquid sealant to asbestos-containing materials to reduce the tendency of the material to release fibers.

23. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing materials or equipment containing ACM debris.

24. Facility: An institutional, commercial or industrial structure, installation or building.

In this Specification, the facility is the Authority's Blue Line Maverick Station, Boston, Massachusetts.

25. Fixed Items: Equipment, mechanical systems, or other objects which cannot be removed from the work area without cutting/demolition, plus walls and floors.

26. Friable Asbestos-Containing Material: Material that contains one percent or more asbestos, which when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. The term includes non-friable ACM that becomes damaged to the extent it may be crumbled, pulverized, or reduced to powder by hand pressure.

27. HEPA Filtered Exhaust Units or Fans: A fan equipped with a High Efficiency Particulate Air (HEPA) filter, greater than 99.97 percent efficient by 0.3 micron DOP test, and complying with ANSI Z9.2(1979), Local Exhaust Ventilation. It shall be used to create a negative pressure in a work area (reduced with respect to surrounding areas) in order to prevent the escape of asbestos fibers. It shall also be used to reduce and control the airborne concentration of asbestos fibers.

28. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air (absolute) filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

29. High-Efficiency Filter: A filter which removes from air 99.97% or more of monodisperse dioctyl phthalate (DOP) particles have a mean particle diameter of 0.3 micrometer.

30. Industrial Hygienist: A professional qualified by education, training and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards.

31. Isolation Barriers: The construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the workplace from surrounding areas and to contain asbestos fibers in the work area.

32. Log: An official record of all activities that occurred during the project and it shall identify the building, agent, contractor, workers, and other pertinent information.

33. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

34. Negative Initial Exposure Assessment: A demonstration by the Contractor that employee exposure during an operation is expected to be consistently below the PEL.

35. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).

36. Permissible Exposure Limit (PEL): An exposure limit that is published and enforced by OSHA as a legal standard.

37. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

38. Presumed Asbestos Containing Material (PACM): Thermal system insulation and surfacing material found in buildings constructed no later than 1980.

39. Project Designer: An individual who has successfully completed the training requirements for an abatement Project Designer established by 40 CFR 763 and is licensed by the Massachusetts Department of Labor and Workforce Development as an Asbestos Abatement Project Designer.

40. Protect Fixed Items: Shall mean to cover with solid enclosures and/or 6-mil polyethylene sheeting, and secure by taping or gluing water and airtight.

41. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

42. Regulated Area: An area established by the Contractor to demarcate areas where Class I and II asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed the permissible exposure limit.

43. Seal, or Block and Seal: Preparing a space or area such that there is no air movement or passage to and from the area. "Isolation barrier" shall mean the system of seals or other items which prevent air movement to and from any work area.

44 Subconsultant: Environmental Professional (ATC Associates Inc.) employed by Consultant.

45. Surface barriers, Protective Coverings or Polyethylene: The plasticizing of walls, floors, and fixed objects within the work area to prevent contamination during subsequent abatement activities.

46. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

47. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

48. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have

been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos contaminated waste.

49. Work Area: The area where asbestos related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.1101. A work area is considered a contaminated space between the time preparation begins and the time the area is certified clean.

1.04 SUBMITTALS

A. The Contractor shall submit to the Subconsultant the following listed items within 30 Days after notice to proceed. No asbestos removal work activities shall commence until these items are reviewed and accepted by the Subconsultant. Submittal data shall be in sufficient detail to enable the Subconsultant to identify the particular product or equipment, and to form an opinion as to its conformity to the Specifications. Each submittal item shall be identified with a cover page and/or transmittal sheet containing the listed submittal number. The Subconsultant may reject the entire submittal package if not submitted in the same order presented below.

1. Name and experience of proposed Supervisors and Foremen (Submittal #1).

2. Summary of workforce by disciplines, and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained in asbestos removal work, respirator use, and appropriate Massachusetts DLWD, EPA & OSHA standards (Submittal #2).

3. Notarized Certification: Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with OSHA (Submittal #3).

4. Plan of Action & Standard Operating Procedures: Submit a detailed site-specific plan of the procedures proposed for use in complying with the requirements of this Specification. Include in the plan the specific location and layout of decontamination areas and negative air units; location of lighting and power outlets; distribution of amended water; the sequencing of asbestos work; detailed schedules by dates, shift times, and work activities during that shift; the interface of trades involved in the performance of work; methods to be used to assure the safety of building occupants and visitors to the site, and a detailed description of the methods to be employed to control pollution. The Plan shall also include/address the following.

   a. The standard operating procedures and/or Plan shall ensure:

      1. Proper protective clothing and respiratory protection prior to entering the work space from the outside.

      2. Safe work practices in the work place, including provisions for inter-room communications; exclusion of eating, drinking, smoking; or use of procedures or equipment that would in any way reduce the

effectiveness of respiratory protection or other engineering controls.

3. Proper exit practices from the work space to the outside through the showering and decontamination facilities.

4. Removing asbestos-containing materials in ways that minimize release of fibers.

5. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

6. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

7. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces, and entanglements in loose hoses and equipment.

8. Provisions for effective supervision, and OSHA-specified personnel air monitoring for exposure during the work.

9. Project sequencing.

10. Waste segregation, minimization, decontamination packaging and disposal.

11. Provisions for the removal and disposal of waterproofing material.

12. Any other items as noted in this Specification or as required by the Subconsultant to be addressed upon submittal review.

b. Provide the following information for exposure controls:

1. Number of negative air machines required and the calculations necessary to determine the number of machines for each work area.

2. Description of projected airflow within each work area and methods required to provide adequate air flow in all portions of the work area.

3. Pressure differential across work area enclosures anticipated.

4. Description of methods of testing for correct airflow and pressure differentials.

5. Manufacturer's product data on the machines to be used.

6. Location of the machines in the work space.

7. Method of supplying adequate power to the machines.

8. Description of work practices to insure that airborne fibers travel downstream from workers.

9. Manufacturer's product data on equipment used to monitor pressure differential between inside and outside of work area. (Submittal #4)

5. Contingency Plan: Submit a contingency plan for emergencies including fire, accident, power failure, negative air system failure, supplied air system failure, or any other event that may require modifications or abridgment of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this Specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Include telephone number and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company (Submittal #5).

6. Summary of other proposed materials and equipment (manufacturer, catalog number or model, and description) and method of application or use, including but not limited to wetting agents, personal protective equipment, and test samples of all proposed materials for performing the work (Submittal #6).

7. A plan describing the method for exposure monitoring to document compliance with OSHA Asbestos Standard, including frequency of monitoring, equipment and calibration methods, and name of analysis laboratory (Submittal #7).

8. All required permits and licenses (Submittal #8).

9. Copies of the completed U.S. EPA, State, and local asbestos removal pre-notification forms (Submittal #9).

10. Copies of all proposed daily inspection and record logs, including work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance, and other work applicable activities (Submittal #10).

11. Name, location, and applicable licenses for primary and secondary landfill for disposal of asbestos-containing or asbestos-contaminated waste. Name and applicable federal and state permits for transporter of asbestos waste materials. (Submittal #11).

12. Respiratory Protection Program: Submit level of respiratory protection intended for each operation required by the Project (Submittal #12).

13. Historic Airborne Fiber Data: Submit airborne asbestos fiber count data from an independent air monitoring firm to substantiate selection of respiratory protection proposed. Data submitted shall include at least the following for each procedure required by the work: (Submittal #13)

Name of Testing Laboratory (Must be a State Certified Lab)

Dates of measurements

Operations monitored

Sampling and analytical methods used and evidence of their accuracy.

Number, duration, and results of samples taken.

14. Resume Information: Submit resume and information on training for individual monitoring the operation of supplied air respiratory systems. Submit training certifications where applicable (Submittal #14).

B. The Contractor shall submit to the Subconsultant the following items prior to individual workers being allowed to work on the project:

1. Submit copies of the training certificates and current Massachusetts Department of Labor and Workforce Development license for each worker.

2. Report from Medical Examination: Submit a copy of Physician's Written Opinion for medical examination conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the work area.

C. During Abatement Activities:

1. Submit weekly job progress reports detailing abatement activities. Include review of progress with respect to previously established milestones and schedules, major problems and action taken, injury reports, equipment breakdown, and bulk material and air sampling results conducted by Contractor.

2. Submit each week copies of all transport manifests, trip tickets, and disposal receipts for all asbestos waste materials removed from the work area during the abatement process.

3. Submit each week daily copies of worksite entry logbooks with information on worker and visitor access.

4. Submit each week logs documenting filter changes on respirators, HEPA vacuums, negative pressure ventilation units, and other engineering controls.

5. Submit each week results of air sampling data collected during the course of the abatement including OSHA compliance air monitoring results.

6. Post, in the clean room of the worker decontamination enclosure, a list containing names, addresses, and telephone numbers of the Contractor, the Authority, the Asbestos Abatement Project Monitor, the General Superintendent, the testing laboratory, and any other personnel who may be required to assist during abatement activities.

1.05 PROJECT COORDINATION - ASBESTOS ABATEMENT

A. Minimum administrative and supervisory requirements necessary for coordination of work on the Project include but are not necessarily limited to the following:

1. Administrative and supervisory personnel.

2. Special reports.

3. Contingency Plan.

4. Notifications to other entities at job site.

B. Administrative and Supervisory Personnel:

1. General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person shall generally remain outside the work area, except for daily checks on the quality and progress of work, and be available to the Authority and the Subconsultant at all times while work is in progress.

2. This person is the Competent Person as required by OSHA in 29 CFR 1926 for the Contractor and is the Contractor's representative responsible for compliance with all applicable federal, state and local regulations, particularly those relating to asbestos-containing materials. This person must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, have had a minimum of four (4) years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person.

3. Provide a full-time non-working supervisor/foreman for each work area who is experienced in the supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person shall remain inside the work area at all times while work is in progress. This person must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, have a minimum of two years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a competent person. This person must also be certified by the Commonwealth of Massachusetts as an Asbestos Abatement Supervisor as required by 453 CMR 6.00.

C. Special Reports: Except as otherwise indicated, submit special reports directly to the Subconsultant within one day of occurrence requiring special report, with copy to others affected by occurrence.

1. Reporting Unusual Events: When an event of unusual and significant nature occurs at site (examples: failure of negative pressure system, rupture of critical barriers), prepare and submit a special report listing chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise

the Subconsultant in advance at earliest possible date.

2. Reporting Accidents: Prepare and submit reports of any accidents, at site and anywhere else work is in progress. Record and document data and actions; comply with industry standards. For this purpose, an accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

D. Contingency Plan:

1. Contingency Plan: Prepare and submit for approval a contingency plan for emergencies including fire, accident, power failure, negative air system failure, supplied air system failure, or any other event that may require modification or abridgment of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this Specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.

2. Post: In clean room of decontamination facility telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.

E. Notifications to other entities at job site: Notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos containing materials, requirements relative to asbestos set forth in these Specifications and applicable regulations.

F. Prior to the start of work, the Contractor will prepare and submit a detailed removal plan to the Subconsultant for review and approval. This plan must comply with all applicable Federal, State, and local regulations.

1.06 SCHEDULES AND REPORTS

A. Coordination: Coordinate both the listing and timing of reports and activities required by provisions of this section and other sections, so as to provide consistency and logical coordination between the reports. Maintain coordination and correlation between separate reports by updating at weekly or shorter time intervals. Make appropriate distribution of each report and updated report to all parties involved in the work including the Subconsultant. In particular provide close coordination of the progress schedule, schedule of values, listing of subcontractors, schedule of submittals, progress reports, and payment requests.

B. Schedules: Provide proposed detailed schedule including work dates, work shift times, number of employees, dates of start and completion including dates of preparation, removals and final inspection dates. Submit schedule with Plan of Action - See Paragraph 1.04(A)(4).

C. Sequence: Provide proposed project sequencing. Submit sequencing with Plan of Action (See Paragraph 1.04(A)(4)).

D. Daily Log: Maintain within the Decontamination Facility a daily log documenting the dates and time of but not limited to, the following items:

- Visitations; authorized and unauthorized attempts.
- Personnel, by name and Social Security Number, entering and leaving the work area.
- Special or unusual events, i.e., Barrier breaching, Equipment failures.
- Air monitoring tests and test results as required by OSHA.
- Inspection of work area preparation prior to start of removal and daily thereafter.
- Removal of any polyethylene barriers.
- Contractors inspections prior to encapsulation.
- Removal of waste materials from work area.
- Decontamination of equipment (list items).
- Final inspection/final air test analysis results.

Provide two copies of this log at final closeout of project for use by the Subconsultant.

1.07 PRE-CONSTRUCTION CONFERENCE & MEETINGS

A. Prior to start of any work, the Contractor shall meet at project site with the Subconsultant, Authority, and other entities concerned with asbestos abatement work. Record discussions and agreements and furnish copy to each participant as required by the Authority.

B. In addition to specific coordination and pre-installation meetings for each element of work, and other regular project meetings as for other purposes, Subconsultant will hold general progress meetings as required scheduled, where possible, with the preparation of payment request. Require each entity then involved in planning, coordination or performance of work to be represented properly at each meeting.

1.08 GENERAL APPLICABILITY OF CODES, REGULATIONS AND STANDARDS

A. Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes, regulations, and standards have the same force and effect (and are made part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound within.

B. The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices and the protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor shall hold the Subconsultant and its representatives harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors.

C. Federal Requirements: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials include the following:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

   a. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite, Final Rules Part 1926, Section 1101 of the Code of Federal Regulations

   b. Respiratory Protection Standard
   Title 29, Part 1910, Section 134 of the Code of Federal Regulations

   c. Construction Industry
   Title 29, Part 1926, of the Code of Federal Regulations

   d. Access to Employee Exposure and Medical Records
   Title 29, Part 1910, Section 2 of the Code of Federal Regulations

   e. Hazard Communication
   Title 29, Part 1910, Section 1200 of the Code of Federal Regulations

   f. Specifications for Accident Prevention Signs and Tags
   Title 29, Part 1910, Section 145 of the Code of Federal Regulations

2. U.S. Environmental Protection Agency (EPA) including but not limited to:

   a. Asbestos Abatement Projects Rule
   40 CFR Part 762
   CPTS 62044, FRL 2843-9
   Federal Register, Vol 50 No 134, July 12, 1985
   P28530-28540

   b. Regulation for Asbestos
   Title 40, Part 61, Sub-part A of the Code of Federal Regulations

   c. National Emission Standard for Asbestos
   Title 40, Part 61, Sub-part M (Revised Sub-part B) of the Code of Federal Regulations

   d. Hazardous Waste Regulation
   Title 40, Parts 260-263

3. U.S. Department of Transportation, Title 49, Parts 172 and 173:

D. State Requirements: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials include the following:

1. Massachusetts Department of Labor and Workforce Development Regulations For

The Removal, Containment or Encapsulation of Asbestos Title 453 Section 6.00 of the Code of Massachusetts Regulations

2. Massachusetts Department of Environmental Protection:

   a. Air Pollution Control Regulations
   Title 310, Chapter 7, Section 7.15 of The Code of Massachusetts Regulations

   b. Solid Waste Regulations
   Title 310, Chapters 18 and 19 of The Code of Massachusetts Regulations

   c. Sewer Use Regulations
   Title 360, Chapter 10 of The Code of Massachusetts Regulations

3. Massachusetts Water Resources Authority

   a. Discharge permitting requirements

E. Local Requirements: Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

1. City of Boston Department of Health

   a. 1.05 CMR, Section 440.353

2. City of Boston Fire Department

   a. Fire Prevention Code, Article 1, Section 1.05 and Article XX, Section 20.03

F. Reference Guidelines: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials include the following:

1. American National Standards Institute (ANSI)
   1430 Broadway
   New York, New York 10018
   (212) 354-3300

   a. Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Publication Z9.2-79

   b. Practices for Respiratory Protection, ANSI Publication Z288.2-80

1.09 NOTIFICATIONS, PERMITS, AND LICENSES

A. Send Written Notification: As required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact at least 10 Days prior to beginning any work on asbestos-containing materials. Send notification to the following address:

Asbestos NESHAPS Contact
Air Management Division
USEPA
JFK Federal Building
Boston, MA 02203

B. State and Local Agencies: Send written notification as required by state and local regulations prior to beginning any work on asbestos-containing materials.

1. Commonwealth of Massachusetts - Department of Environmental Protection and Department of Labor and Workforce Development. Sent written notification 10 working Days prior to beginning any work on asbestos containing materials.

2. City of Boston - Department of Health and Hospitals, Office of Environmental Health. Send Asbestos Abatement Work Application 10 working Days prior to the start of work.

3. City of Boston Fire Department. Send written notification 10 Days prior to the start of work.

C. Licenses: Maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this Contract.

D. Posting and Filing of Regulations: Maintain two (2) copies of applicable federal, state and local regulations above. Post one copy of each at the job site and keep one copy of each regulation file in Contractor's office.

1.10 AVAILABILITY OF TRAINED PERSONNEL

A. There shall be a sufficient number of trained, licensed and qualified workers, foremen and superintendents to accomplish the work within the required schedule, which may require work to be performed 24 hours a day, seven days a week. No untrained, unlicensed nor fully qualified and pre-approved person shall be employed to speed up completion of the abatement work.

1.11 RESPIRATORY PROTECTION

A. The Contractor shall provide all workers, foremen, superintendents, authorized visitors, and inspectors personally-issued and marked respiratory protective equipment approved by NIOSH and OSHA. When respirators with disposable filters are employed, the Contractor shall provide sufficient filters for replacement as necessary by the worker or authorized visitor. Filters shall be disposed of as contaminated waste.

B. Instruct and train each worker involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the work area from the start of any operation which may cause airborne asbestos fibers until the work area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the

work place or as required for other toxic or oxygen-deficient situations encountered.

C. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

OSHA -U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1926.1101.

CGA - Compressed Gas Association, Inc., New York, Pamphlet G-7, "Compressed Air for Human Respiration", and Specification G-7.1 "Commodity Specification for Air".

CSA - Canadian Standard Association, Rexdal, Ontario, Standard Z180.1-1978, "Compressed Breathing Air".

ANSI - American National Standard Practices for Respiratory Protection, ANSI Z88.2-1980.

NIOSH - National Institute for Occupational Safety and Health.

MSHA - Mine Safety and Health Administration.

D. Initial Exposure Assessment

1. The Contractor shall ensure that a "competent person" conduct an exposure assessment immediately before, or at the initiation of work to determine expected exposures during the work. For Class I asbestos work, until the Contractor conducts exposure monitoring and documents that workers on the job will not be exposed in excess of the Permissible Exposure Limit (PEL), or otherwise makes a negative exposure assessment, the Contractor shall assume that workers are exposed in excess of the PEL or excursion limit.

2. The Contractor may demonstrate that worker exposures will be below the PEL (Negative Exposure Assessment) by data which conforms to the following:

   a. Objective data which demonstrates that the material containing asbestos can not release airborne fibers in concentrations exceeding the TWA and excursion limit, or

   b. The Contractor has monitored prior asbestos projects for the PEL and excursion limit within one year of this project and the data was obtained during work operations and conditions which "closely resembles" the processes, type of material, control methods, work practices as that on this project and that the operations were conducted by workers whose training and experience are no more extensive than that of the workers who will work on this project; and this data shows that for the conditions present on this project, there is a high degree of certainty that worker exposures will not

exceed the TWA and excursion limit; or

c. The results of initial exposure monitoring of this project for 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely to take place during the entire course of this project result in exposures below the PEL.

E. Respiratory Protection Selection:

1. The Contractor shall provide the appropriate respirator to all workers (and ensure that the employee uses the respirator provided) as specified below:

Airborne Concentration of Asbestos	Required Respirator
Not in excess of 1 f/cc (10 X PEL)	Half-mask air-purifying respirator equipped with HEPA filters.
Not in excess of 5 f/cc (50 X PEL)	Full face piece air-purifying respirator equipped with HEPA filters.
Not in excess of 10 f/cc (100 X PEL)	Any Powered Air Purifying Respirator (PAPR) equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode.
Not in excess of 100 f/cc (1,000 X PEL)	Full face piece supplied air respirator operated in pressure demand mode.
Greater than 100 f/cc (1,000 X PEL) or unknown concentration	Full face piece supplied air respirator operated in pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

2. The Contractor shall provide a half-face air purifying respirator equipped with high efficiency filters whenever a worker performs Class II asbestos abatement where a negative exposure assessment is not produced.

3. The Contractor shall provide a full face piece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus for all workers within a regulated area where Class I work is being performed for which a negative assessment has not been produced or if the TWA exposure to asbestos exceeds 1 fiber/cc. If the TWA exposure to asbestos remains below 1 fiber/cc, then PAPRs shall be worn at all times.

4. Contractor is encouraged to choose respirator types that provide greater protection factors than those required above based on exposure levels.

5. Single-use, disposable respirators shall not be permitted or allowed on the work site.

6. Half- or Full-Face Air Purifying Respirators shall only be worn by personnel when

approved by a physician, and after a quantitative or qualitative fit test is performed by an experienced industrial hygienist pursuant to OSHA regulations. Written copies of the results of these fit tests shall be provided to the Subconsultant before any work activities begin. Personnel that have not been fit-tested, or have failed the fit test, shall use (at a minimum) powered air purifying respirators (PAPRs) at all times.

E. Respiratory protection as specified herein shall be worn at all times, including preparation of the work areas, loading and unloading of waste containers in the work area or at the transport truck, cleaning of work areas, and performance of glove bag removal work.

F. Facial hairs such as beards, long sideburns, and mustaches, which could interfere with the seal of air purifying type respirators, shall not be allowed.

G. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:

1. Respiratory protection shall be inspected and decontaminated on a daily shift basis in accordance with OSHA 29 CFR 1910. 134(b).

2. HEPA filters for negative pressure air filtering respirators shall be changed after each shower.

3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures as stated herein.

4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator face pieces shall be worn into the shower. Filter/power pack assemblies shall be decontaminated in accordance with manufacturer's recommendations.

5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted.

6. Organic solvents shall not be used for washing of respirators.

7. Whenever respirator design permits, workers shall perform a positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow (using the methods specified by the manufacturer) every four (4) hours of use and each time the worker enters or exits the work area. Written logs of these tests shall be maintained by the Contractor.

8. The Contractor shall furnish to the Subconsultant written documentation that each worker is medically approved to wear respirators and has been properly trained in their use, inspection, care, maintenance, and fitting testing pursuant to the Contractor's written Respirator Plan and applicable regulations.

H. Air Purifying Respirators:

1. Negative Pressure - Half or Full Face Mask: Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the workday. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the work area. Require that new filters be installed each time a worker re-enters the work area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.

2. Powered Air Purifying - Half or Full Face Mask: Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords to be washed each time a worker leaves the work area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

3. Initial Fitting: Provide initial fitting of respiratory protection during an approved respiratory protection training course. Fit types of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which he has been trained and fit.

4. On a Weekly Basis: Check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.

5. Upon Each Wearing: Require that each time an air-purifying respirator is put on, it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

I. Type "C" Respirator:

1. Air Systems Monitor: Continuously monitor the air system operation including compressor operation, filter system operation, backup air capacity and all warning and monitoring devices at all times that system is in operation. Assign an individual trained, by manufacturer of the equipment in use or by a Certified Industrial Hygienist, in the operation and maintenance of the system to provide this monitoring. Assign no other duties to this individual which will take this person away from monitoring the air system.

2. The Compressed Air System for Type "C" Respirators (if utilized) shall be high pressure, with a compressor capacity to satisfy the respirator manufacturer's recommendations. The receiver shall have sufficient capacity to allow a 30 minute escape time for the respirator wearers in the event of compressor failure or malfunction. The Compressed Air System shall have compressor failure alarm, high temperature alarm, carbon monoxide alarm, and suitable in-line air purifying adsorbent beds and filters to assure Grade "F" Breathing Air. (See Part 2 -Materials)

3. Where Type "C" Respirators are used, they shall be worn with a belt to minimize

possibility of dislodging face mask when hose is snagged in the work area.

4. The Contractor shall provide at all times a minimum of six spare hoses for the Subconsultant and authorized visitors and inspectors to connect to their assigned Type "C" Respirator without having to wait for removal of workers from the work area to obtain a hose connection.

1.12 TEMPORARY FACILITIES

A. The Contractor shall provide water and electric service sufficient to perform and complete the work of this Specification. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the work. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

B. Scaffolding: Provide all scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type; or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

1. Equip rungs of all metal ladders, etc. with an abrasive non-slip surface.

2. Provide a nonskid surface on all scaffold surfaces subject to foot traffic.

3. During the erection and/or moving of scaffolding, care must be exercised so that the contaminated debris on the floor and other surfaces is not disturbed.

4. At the completion of abatement work, clean all construction aids within the work area.

C. Water Service: All water shall be supplied by the Contractor. Sufficient water shall be brought on site by the Contractor or the Contractor shall make arrangements to use a nearby fire hydrant. Sufficient hot water for all workers shall be supplied by Contractor at a minimum temperature of 100 degrees F.

1. Temporary Water Service Connection: All connections to the water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment.

2. Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each work area and to each decontamination unit. Provide temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. Maintain hose connections and outlet valves in leakproof condition.

3. Hot Water Heater: Provide UL rated 40 - 80 gallon electric hot water heater to

supply hot water for the decontamination unit shower. Activate from 30 amp circuit breaker located within the decontamination unit subpanel. Provide with relief valve compatible with water heater operation; provide piping from relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 12" X 12" X 6" deep pan, made of 19 gauge galvanized steel, with handles. Wiring of the hot water heater shall be in compliance with NEC, Massachusetts modifications to the NEC, and UL standards.

D. Electrical Service: Comply with applicable NEC, Massachusetts modifications to the NEC, and UL standard and governing regulations for materials and layout of temporary electric service. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work and acceptable to Subconsultant.

1. Temporary Power: Provide service to decontamination unit sub-panel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the main distribution panel. Sub-panel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.

2. Provide electrical outlets (and extension cords) in the clean room, equipment room, and at locations inside and outside the work area as required by the Subconsultant for the exclusive use of the Subconsultant for air monitoring purposes. Since the Regulations will require between 35-50 or more PCM air samples for final clearance purposes for a work area, the outlets and cords must be in sufficient numbers and locations to allow these samples to be taken simultaneously.

E. Temporary Lighting: Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight and portable plug-in task lighting. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

F. Sanitary Facilities: Provide one self-contained chemical toilet for each ten workers (as a minimum). Toilets shall be located outside the asbestos abatement work areas.

G. Temporary Heating: Provide temporary heat where indicated or needed for performance of the work. Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the fuel being consumed. Use Type MUH Unit heaters from Qmark or other heating units approved by MBTA Safety Department. No open fires or burning will be allowed.

H. Fire Extinguishers: Comply with the applicable recommendation of NFPA Standard 10 "Standard For Portable Fire Extinguishers." Locate fire extinguishers where they are most convenient and effective for their intended purpose, but provide no less than one extinguisher in the corner of each work area, one in each Equipment Room, and one outside each work area in the Clean Room.

1.13 DECONTAMINATION FACILITIES (DF)

A. For Class I work involving less than 25 linear feet or 10 square feet of thermal or surfacing ACM and PACM, and for Class II asbestos work operations where exposures exceed a PEL, or where there is no negative exposure assessment produced before the project, the Contractor shall provide the following:

1. An equipment room or area adjacent to the regulated area for the decontamination of workers and their equipment which is contaminated with asbestos which shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface.

2. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

3. Work clothing must be cleaned with a HEPA vacuum before it is removed.

4. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or work area.

5. The Contractor shall ensure that all workers enter and exit through the equipment room or area.

6. Provide an air lock leading into the equipment room or area that is physically and visually separated from the equipment room or area.

B. For Class I work involving more than 25 linear feet or 10 square feet of thermal or surfacing ACM and PACM, the Contractor shall establish a decontamination area that is adjacent and connected to the regulated area for the decontamination of workers. The decontamination area shall consist of an equipment room, shower area and clean room in series. The Contractor shall ensure that workers enter and exit the regulated area through the decontamination area. The Contractor shall provide the following:

1. Equipment Room (Dirty Room): Provide Equipment Room with airlocks to the work area and Shower Room, large enough for all workers to remove and dispose of contaminated protective clothing, and for storage of contaminated Contractor equipment.

2. Shower Room: Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the work area from the Changing Room, or for showering by workers headed out of the work area after undressing in the Equipment Room. The shower room facilities and size shall be adequate to allow decontamination and thorough washing of all the workers and visitors within the 30 minute escape time allowed under air compressor failure (if Type C Supplied Air Respirators are used).

   a. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan.

Install a freely draining wooden floor in shower pan at elevation of top of pan.

b. Provide shower head and controls.

c. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.

d. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.

e. Arrange so that water from showering does not splash into the Changing or Equipment Rooms.

f. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the work area.

g. Provide flexible hose shower head.

h. Pump waste water to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron waste water filters in line to drain approved by the Subconsultant or waste water storage. Change filters daily or more often if necessary. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.

3. Clean Room (Changing Room): Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing. Locate so that access to work area from Clean Room is through Shower Room.

a. Require workers to remove all street clothes in this room, dress in clean disposable coveralls, and don respiratory protection equipment. Do not allow asbestos contaminated items to enter this room. Require workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.

b. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.

c. Damp wipe all surfaces twice after each shift change with a disinfectant solution.

d. Provide a continuously adequate supply of disposable bath towels.

e. Provide posted information for all emergency phone numbers and procedures.

C. Construction: Decontamination facilities shall be located in areas acceptable to the

Subconsultant and as shown on the Contractor's approved Work Plan. Construction shall have load-bearing capabilities if required to support workers overhead. DF shall be fully lined utilizing two layers of 6-mil opaque polyethylene sheeting at a minimum. The entire floor of the DF shall be covered with two (2) layers of 6-mil polyethylene sheeting turned up 12-16" on the wall layers. The upper layer of floor polyethylene sheeting shall be replaced as wear necessitates (or as determined by the Subconsultant). The floor of the DF Shower Room shall be sealed and maintained watertight at all times. Leaks shall be immediately cleaned up and then the cause repaired to the satisfaction of the Subconsultant. The interior surfaces of the walls, floor, and ceiling shall then be covered with an additional two layers of 6-mil polyethylene sheeting sealed water and airtight with duct tape at all overlapping seams.

D. Air Locks: Shall be constructed by placing three overlapping sheets of plastic over a framed doorway, securing each along the top of the doorway. The first and third sheets shall be secured on one side of the doorway and the middle sheet shall be secured on the other side of the doorway. The distance between doorways must allow enough space for one doorway to be closed before the next doorway is opened (i.e., approximately three (3) feet).

E. Provide heating and HEPA-filtered exhaust ventilation for all decontamination systems so that air flow will be from the clean outside towards the contaminated workspace.

F. Cleaning: The decontamination facility shall be cleaned using a HEPA-filtered vacuum at least once every shift, or more frequently if needed to prevent residue accumulation.

G. Prohibitions: Smoking, drinking, or eating shall not be permitted in the work area, Shower Room or Equipment Room. Personal equipment such as radios or flashlights shall not be permitted in the work area, Shower Room or Equipment Room unless they can be washed in the shower.

H. The Contractor shall post or have available the following items in each clean room of the worker decontamination facility.

1. A copy of the U.S. Environmental Protection Agency Regulations for Asbestos, 40 CFR 61 Subparts A and M; and a copy of OSHA Asbestos Regulations, 29 CFR 1926.1101;

2. A copy of the Massachusetts Department of Labor and Workforce Development Regulations for Asbestos, 453 CMR 6.00.

3. A list of telephone numbers for local hospital, location of hospital and/or emergency squad, local fire department, and the name and telephone number of the Subconsultant.

4. A copy of the asbestos abatement Specifications and Drawings.

5. A copy of the respirator protection program which conforms to the requirements of 29 CFR 1910.134(b).

6. A listing of all employees, by name, social security number and Massachusetts Asbestos Abatement Worker or Supervisor/Foreperson Certification Number working

on the Project.

7. A legible copy of each assigned employee's Massachusetts License.

8. A daily sign in/out log which identifies persons by name and Massachusetts Asbestos Certification Number, who are/were at the site, and the length of the time each spent at the site.

I. A solid, hinged door with a single cylinder dead-bolt lock shall be installed at the outside entrance to each decontamination facility. Provide a shutter which opens on make-up air inflow and seals on air flow cessation. This door shall be closed and locked whenever the work area is unattended. Two sets of keys for the lock shall be distributed to the Subconsultant.

J. Ensure that barriers and plastic linings are effectively sealed and taped at all times, and that the Shower Room floor is watertight. Repair damaged barriers, and remedy defects immediately upon discovery. Visually inspect the facility at the beginning of each work period. The Subconsultant shall also be allowed to use smoke generators to test effectiveness of barriers, flow of air through the DF, and HEPA-exhaust systems.

K. Maintain emergency and fire exits from the work areas, or establish alternative exits satisfactory to local fire officials and the Subconsultant. Exits shall be checked daily for exterior blockages or impediments to exiting.

L. Signs: Post an approximately 20 inch by 14 inch manufactured caution sign at each entrance to the work area displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

Provide spacing between respective lines at least equal to the height of the respective upper line.

M. Equipment and Waste DF - Where space allows, provide a separate decontamination facility consisting of a serial arrangement of rooms, Holding area, and Wash Room for removal of equipment and material from the work area. Do not allow personnel to enter or exit work area through Equipment decontamination facility. Equipment and Waste DF shall be constructed as described above.

1.14 PERSONNEL PROTECTION AND DECONTAMINATION

A. Protective Clothing

1. Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area.

2. Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Paint uppers of all boots red with water proof enamel. Do not allow boots to be removed from the work area for any reason, after being contaminated with asbestos containing material. Dispose of boots as asbestos contaminated waste at the end of the work or seal in 6-mil polyethylene bags (with labels) for transportation to another work area.

3. Goggles: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Goggles are not required if full face respiratory protection is used.

4. Gloves: Provide work gloves to all workers and require that they be worn at all times in the work area. Do not remove gloves from work area and dispose of as asbestos-contaminated waste at the end of the work.

5. Hard Hats: Provide hard hats to all workers and authorized visitors and require that they be worn at all times in the work area. Hard hats shall be worn over the hood of the coveralls.

6. Additional Protective Equipment: Respirators, disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the Subconsultant, and other authorized visitors who may inspect the job site.

B. Each Time Work Area is Entered: Remove all street clothes in the Changing Room of the Personnel decontamination unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through Shower Room to Equipment Room and put on work boots.

C. Decontamination Procedures: Require all workers to adhere to the following personal decontamination procedures whenever they leave the work area:

1. Type "C" Supplied Air or Powered Air-Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the work area:

- When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.

- While still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:

- Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.

- With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.

- Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breath.

- Carefully wash facepiece of respirator inside and out.

- If using PAPR: shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.

- Shower completely with soap and water.

- Rinse thoroughly.

- Rinse shower room walls and floor prior to exit.

- Proceed from shower to Changing Room and change into street clothes or into new disposable work items.

2. Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the work area with a half or full face cartridge type respirator:

- When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.

- Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid asbestos fibers while showering. The following procedure is required as a minimum:

- Thoroughly wet body from neck down.

- Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.

- Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
- Dispose of wet filters from air purifying respirator.
- Carefully wash facepiece of respirator inside and out.
- Shower completely with soap and water.
- Rinse thoroughly.
- Rinse Shower Room walls and floor prior to exit.
- Proceed from shower to Changing Room and change into street clothes or into new disposable work items.

D. Within Work Area: Require that workers NOT eat, drink, smoke, chew gum or tobacco, or use toilet facilities (either existing or temporary) in the work area. To eat, chew, drink or smoke, workers shall follow the procedure described above, then dress in street clothes before entering the non-work areas of the building.

E. Post written procedures in work place and train all personnel on the procedures for the evacuation of the injured and the handling of potential fires. Provide aid to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination during evacuations and fire procedures.

F. The Contractor shall instruct all employees and workers in the proper care of their personally issued respiratory equipment, including daily maintenance, sanitizing procedures, etc.

G. All respiratory equipment shall be inspected by Contractor's project supervisory personnel at the beginning of each work period, including breaks and lunch periods. Written records of these inspections shall be maintained for review by the Subconsultant.

1.15 EXPOSURE CONTROLS AND HEPA-FILTERED EXHAUST VENTILATION

A. The Contractor shall install inside each work area portable HEPA-filtered exhaust units to maintain the area, including the Decontamination (and Waste Transfer) Facilities, under negative air pressure, and to reduce and control airborne asbestos fiber concentrations. Exhaust systems shall be operated twenty-four hours per day at all times from the time Contractor takes control of the site and during preparation, removal, and cleanup tasks as specified herein; and until acceptable final air clearance is obtained for the work area. In all cases, the units shall exhaust to the outside of the facility.

B. Each exhaust unit shall be equipped as described in Article 2.02. Each unit shall be serviced by a dedicated minimum 115V-20A circuit with overload device.

C. The exhaust system must be capable of providing: 1) at least four (4)full air changes per hour

in each work area; 2) an inward velocity through any openings, including the decontamination facilities, of at least 200 fpm; and 3) a static negative air pressure inside the area of a minimum of 0.02 inches water column.

D. Determine number of units needed by dividing the ventilation requirement (CFM) above by capacity of exhaust unit(s) used. Capacity of a unit for purposes of this Section is the capacity, in cubic feet per minute with fully loaded filters, (pressure differential which causes loaded filter warning light to come on) in the machines labeled operating characteristics. Add a minimum of one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

E. All exhaust air shall pass through HEPA-filters before being discharged to the exterior of a building. The Contractor shall securely install (and seal with caulking) a solid window or door insert with cutouts sized for the exhaust air duct from each HEPA-exhaust unit. The exterior exhaust discharge point shall be at least 40 feet from a receptor such as an air intake port, louvers, or entrances to the building or an adjoining building.

F. Locate exhaust unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses work area as much as possible. This may be accomplished by positioning the exhaust unit(s) at a maximum distance from the worker access opening or other makeup air sources.

G. If there are multiple sealed areas or partition walls within a work area, the exhaust systems shall be arranged so that air flows from the least to most contaminated area, and to prevent spaces from having poor or dead air movement.

H. Provide supplemental make-up air inlets where required for proper air flow through the work space in locations approved by the Subconsultant. Additional make-up air shall be delivered through horizontal shutters which open on make-up air inflow and seal on air flow cessation, or is delivered through a HEPA-filtered supply fan system.

I. Testing The System: Test the negative pressure system before any asbestos-containing material is wetted or removed. After the work area has been prepared, the decontamination facility set up, and the exhaust unit(s) installed, start the unit(s) one at a time. Demonstrate operation and testing of negative pressure system to the Subconsultant. Demonstrating and testing the operation of the negative pressure system will include, but not be limited to, the following:

1. Plastic barriers and sheeting move lightly in toward work area.

2. Curtain of decontamination units move lightly in toward work area.

3. There is a noticeable movement of air through the decontamination unit. Use smoke tube to demonstrate air movement from Clean Room to Shower Room, from Shower Room to Equipment Room, and from Equipment Room to work area.

4. Use a differential pressure meter or manometer to demonstrate a pressure difference of at least 0.02 (0.04 desirable) inches of water across every barrier separating the work area from the balance of the building or outside.

5. The Subconsultant may use smoke generators to confirm that air flowing through all open areas is directed into the decontamination facilities and isolation barrier, and good air turnover conditions exist within the work area. If deficient air flows are reported to the Contractor, the Contractor shall cease work and promptly correct the deficiency.

J. Use Of System During Abatement Operations:

1. Start exhaust units before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run units continuously to maintain a constant negative pressure until final air clearance of the work area is complete. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.

2. Start abatement work at a location farthest from the exhaust units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and exhaust units are operating again.

3. At completion of abatement work, allow exhaust units to run to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the work area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work.

K. On loss of negative air pressure or electric power, all work activities in an area shall stop immediately and shall not resume until power is restored and the HEPA-exhaust systems are operating again. When power failure or loss of negative pressure lasts, or is expected to last, longer than one hour, then the following shall occur:

1. The make-up air inlets in the decontamination facilities shall be sealed airtight.

2. The decontamination facilities shall be sealed airtight after the evacuation of all personnel from the work area.

3. All adjacent areas shall be monitored for asbestos fiber concentration upon discovery of, and subsequently throughout, the power failure.

L. Monitoring: Continuously monitor and record pressure differential between the work area and the building outside the work area with a monitoring device incorporating a continuous recorder. Meter shall be equipped with a warning buzzer which will sound if pressure differential drops below 0.02" of water. The monitor will be located at a point acceptable to the Subconsultant. On a weekly basis, submit printout from pressure differential monitoring equipment. Mark printouts with location, date and start of time for each day.

1.16 SPECIAL CONSIDERATIONS

A. Selective demolition of sheetrock and block walls, drop-ceiling systems and equipment/machinery, etc., will be needed to properly access and remove all the ACM at the site. All such work is part of the work of this Section.

B. The Contractor is responsible for the integrity and safety of all roof areas and the building itself during the project wherever their work involves accessing, disturbing, or otherwise has the potential to affect in any way the existing roofing and other interior/exterior structures. Contractor is responsible for submitting all scaffolding plans.

C. Remove all window and doors, including frames etc., as needed to access all asbestos caulking.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name where applicable.

2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient enough to prevent damage or contamination. Replacement materials shall be stored outside of the work area until abatement is completed.

3. Damaged, deteriorating, or previously used materials shall not be used and shall be removed from the worksite and disposed of properly.

2.02 MATERIALS, TOOLS, AND EQUIPMENT

A. Negative Air Machines: Supply the required number of asbestos air filtration units to the site in accordance with these specifications. Each unit shall include the following:

1. Cabinet: Constructed of steel or other durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Cabinet shall be factory sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance. Access to and replacement of all air filters shall be from intake end. Unit shall be mounted on casters or wheels.

2. Fans: Rate capacity of fan according to useable air-moving capacity under actual operating conditions. Use centrifugal-type fan.

3. HEPA Filters: The final filter shall be the HEPA type. The filter media (folded into

closely pleated panels) must be completely sealed on all edges with a structurally rigid frame.

a. A continuous rubber gasket shall be located between the filter and the filter housing to form a tight seal.

b. Each filter shall be individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles. Testing shall be in accordance with Military Standard Number 282 and Army Instructions Manual 136-300-175A. Each filter shall bear a UL586 label to indicate ability to perform under specified conditions.

c. Each filter shall be marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

4. Pre-filters: which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. The first-stage pre-filter shall be a low-efficiency type (e.g., for particles 10 um and larger). The second-stage (or intermediate) filter shall have efficiency (e.g., effective for particles down to 5 um). Pre-filters and intermediate filters shall be installed either on or in the intake grid of the unit and held in place with special housings or clamps. Pre-filters shall be checked for accumulation at least twice per shift, and shall be changed as frequently as conditions require, especially during asbestos removal or during times of dust creation.

5. Instrumentation: Each unit shall be equipped with a Magnahelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed. A table indicating the useable air-handling capacity for various static pressure reading on the Magnahelic gauge shall be affixed near the gauge for reference or the Magnahelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at the point. Provide units equipped with an elapsed time meter to show the total accumulated hours of operation.

6. Safety and Warning Devices: The unit shall have an electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter or with a filter installed backwards. Units shall be equipped with automatic shutdown system to stop fan in the event of a major rupture in the HEPA filter or blocked air discharge. Warning lights and audible alarms are required to indicate normal operation, too high a pressure drop across the filters (i.e., filter overloading), and too low of a pressure drop (i.e., major rupture is HEPA filter or obstructed discharge).

7. Flexible metal hoses (ducts) of sufficient length must be provided to allow the units to discharge outside of buildings (where possible).

8. Electrical components shall be approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit shall be

equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet shall be grounded.

B. Respirator Protection Equipment

1. Air Purifying Respirators:

a. Respirator Bodies: Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit.

b. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Ducts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

c. Non-permitted respirators: Do not use any single-use, disposable or quarter face respirators.

2. Supplied Air Respirator Systems:

a. Provide equipment capable of producing air of the quality and volume required by the reference standards applied to the job site conditions and crew size. Comply with provisions of this specification. If more stringent that the governing standard.

b. Face piece and hose: Provide a pressure-demand full face piece supplied air respirator incorporating an auxiliary self-contained breathing apparatus (SCBA) which automatically maintains an uninterrupted air supply in pressure demand mode with a positive pressure face piece. Respirator assembly, including hose, shall be NIOSH/MSHA approved. Provide hose approved by respirator manufacturer. Provide sufficient number of hoses for all workers and authorized visitors including regulatory inspectors and Subconsultant 's Representatives.

c. Backup air supply: Provide a reservoir of compressed air located outside the work area which will automatically maintain a continuous uninterruptable source of air automatically available to each connected face piece and hose assembly in the event of compressor shut-down, contamination of air delivered by compressor, power loss or other failure. Provide sufficient capacity in the back-up air supply to allow a minimum escape time of one-half hour times the number of connections available to the work area. Air requirement at each connection is the air requirement of the respirators in use plus the air requirement of an average sized adult male engaged in moderately strenuous activity.

d. Warning device: Provide a warning device that will operate independently of the building's power supply. Locate so that alarm is clearly audible above the noise level produced by equipment and work procedures in use, in all parts of the work area and to the compressor. Connect alarm to warn of:

Compressor shut down or other fault requiring use of backup air supply.

Carbon Monoxide (CO) levels in excess of 5 ppm.

e. Carbon Monoxide (CO) Monitor: Continuously monitor and record on a strip chart recorder Carbon Monoxide (CO) levels. Place monitors in the air lines between compressor and back-up air supply and between backup air supply and workers. Connect monitors so that they also sound at alarm as specified under "Warning Devices".

f. Compressor Shut Down: Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sounded if any of the following occur:

Carbon monoxide (CO) concentrations exceed 5 PPM/v in the air line between the filter bank and backup air supply,

Compressor temperature exceeds normal operating range.

g. Compressor Motor: Provide a compressor driven by an electric motor. Do not use a gas or diesel engines to drive compressor. Insure that electrical supply to be provided at the work site is adequate to energize motor.

h. Compressor Location: Locate compressor outside of building in location that will not impede access to the building, and that will not cause a nuisance by virtue of noise or fumes to occupied portions of the building.

i. Air Intake: Locate air intake remotely from any source of automobile exhaust or any exhaust from motors, or buildings.

j. After Cooler: Provide an after cooler at entry to filter system which is capable of reducing temperatures to outside ambient air temperatures.

k. Self Contained Breath Apparatus (SCBA): Configure system to permit the recharging of 1/2 hour 2260 PSI SCBA cylinders.

l. Air Quality For Supplied Air Respiratory Systems: Provide air used for breathing in Type "C" supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (gaseous Air) Grade H or CSA Z1801.1 whichever presents the most stringent quality standard.

C. Wetting Materials: For wetting prior to disturbance of asbestos-containing materials use amended water. The material must be odorless, non-flammable, non-toxic, non-irritating, and non-carcinogenic. It shall be applied as a mist using a low pressure sprayer recommended by

the manufacturer. Use a mixture of surfactant and water which results in wetting of the asbestos containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

D. Lock-Down Encapsulant: Provide penetrating or lock-down type encapsulants specifically designed for the use intended (as permitted). The material shall not contain organic solvents and be non-flammable, non-toxic, non-irritating, and non-carcinogenic.

E. Polyethylene Sheeting: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mils thick, frosted or black as required by Subconsultant.

F. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to aggressively stick to sheet polyethylene.

G. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

H. Waste Containers: For asbestos waste, provide 6 mil thick leak-tight polyethylene bags labeled with required EPA, DOT, OSHA labels. If the waste material contains sharp edges or may otherwise puncture polyethylene bags, provide drums or other closed containers for storage, transportation, and disposal.

I. Fans and Leaf Blowers: Provide two leaf blowers and one 20" diameter fan per 10,000 cubic feet of work area volume to be used for aggressive sampling techniques for clearance air testing.

J. Filters: Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos contaminated water from the work area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.

- Primary Filter - Pass particles 20 microns and smaller
- Secondary Filter - Pass particles 5 microns and smaller.

K. Sump Pump: Provide totally submersible waterproof sump pump with integral float switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. Adjust float switch so that a minimum of 3" remains between top of liquid and top of sump pan.

L. Warning Signs and Labels - Shall comply with 29 CFR 1926.1101, 1926.62, all other federal, state, or local codes and regulations.

M. Ladders or Scaffolds - Shall be OSHA-approved, and be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the Subconsultant, workers, and other inspectors. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos fibers.

N. Hand Power Tools - Shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut into, or otherwise disturb ACM.

O. Pressure-Differential Recorder - Provide air pressure sensing devices equipped with recorders for continuous monitoring of work area pressure differential. Provide sufficient quantities of chart paper and maintain devices until completion of work.

P. Two Way Radios - Provide Supervisor and all work area Foremen with compatible two-way radios. Provide three compatible two-way radios for the exclusive use of the Subconsultant.

Q. Lumber and Plywood - All lumber and plywood used for temporary barriers and Decontamination Facilities shall be new and of fire retardant grade to comply with the requirement for a flame spread of 25 or less with no evidence of significant progressive combustion when tested for thirty minutes duration under the Standard Test Method for surface burning characteristics of building materials (ASTM E-84, NFPA 255, UL 723 and AWPA C-20 and C-27). Lumber shall have minimum dimensions of 2" x 4" or as specified. Tongue and groove plywood shall be minimum 3/4 inch thickness, other plywood shall be minimum 1/2 inch thickness.

R. Vacuum Cleaning Equipment - Shall be industrial type designed for such use, equipped with High Efficiency Particulate Air (HEPA) filters. Separate dedicated vacuum cleaners shall be used for asbestos work and shall be clearly labeled a to their intended use. No other method will be permitted. Vacuuming equipment shall be Model GA72 or GA73 as manufactured by NILFISK of America, Inc.; Model CMP-1500-P as manufactured by Car-Mon Products, Inc.; equipment manufactured by J. D. Brophy, Inc. or approved equal. The equipment shall be properly operated at all times and shall contain no air leaks. The Subconsultant will inspect all vacuuming equipment prior to its use, and may request verification of the efficiency of the filtration. Each vacuum cleaner shall be emptied and thoroughly cleaned (inside the work area) at the conclusion of the project, or each use.

PART 3 - EXECUTION

3.01 PRE-ASBESTOS ABATEMENT PREPARATIONS

A. The Contractor shall prepare each work area as described in this section. Preparation work shall be performed according to the following general sequence of steps and procedures to insure that proper containment and protection systems are installed prior to any work that could disturb asbestos-containing materials and generate airborne asbestos fibers:

1. Erect decontamination facilities and install HEPA exhaust units.

2. Cover any windows, glass doors, or other openings with plywood and plastic sheets; erect any required barriers, coverings, or access platforms/scaffolding; post access restriction signs; seal all openings into the work area; install any temporary access openings; and install polyethylene sheeting on all floors and walls (except where noted).

3. Provide temporary power and lighting as required for work areas.

4. Obtain Subconsultant's written approval of all preparation work before starting pre-cleaning or removal of asbestos materials.

5. Clean and remove any non-fixed items to storage areas designated by the Subconsultant. Items that cannot be cleaned to the satisfaction of the Subconsultant shall be disposed of as asbestos waste.

6. Carefully clean all surfaces in the work area which may be contaminated with any dust or debris by using a vacuum equipped with a HEPA-filter.

7. Misting of the area shall be conducted throughout all stages of pre-cleaning and general removal to minimize the generation of airborne fibers.

3.02 ISOLATION OF WORK AREAS

A. The Contractor shall isolate each work area for the duration of work by completely closing and sealing all openings and doorways into the work area including, but not limited to doorways, corridors, windows, floors and ceiling penetrations, and lighting. Critical isolation/sealing shall be accomplished by using two (2) layers of 6-mil plastic sheeting taped securely in place, or by caulking, including temporary construction as noted in Paragraph C below. The work area shall be protected and sealed airtight to the extent possible, and be subject to the inspection of the Subconsultant.

B. Emergency and fire exits shall be maintained, or alternative exits shall be established in accordance with applicable codes and regulations. Exits shall be checked daily against blockages or impediments to exiting. Entrances which shall not be used by workers shall be locked against unauthorized entry. Arrange exit door so that it is secure from outside the work area but permits exiting from the work area. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1" wide. Hang a razor knife on a string beside

outline. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least one foot high and 2" thick. Provide lighted EXIT sign at each exit. Provide battery-operated emergency lighting that switches on automatically in the event of a power failure. Paint arrows on walls and floor with luminescent paint to direct workers to nearest emergency exit.

C. Isolation Partitions and Barriers - Open doorways etc. shall be sealed airtight with temporary structural partitions as follows:

1. Erect wood or metal studs, 16" o.c., and then cover the opening with 1/2" plywood sheeting (or equivalent) on work area side only.

2. Cover the work side of this partition with a double layer of plastic sheeting with joints staggered and sealed with tape partition at floor, walls, ceiling, and all joints shall be caulked airtight.

D. Construct rigid enclosures and install Decontamination Facilities as required.

E. Provide temporary power and lighting to work areas, and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements and OSHA requirements for temporary lighting in the environmental normal to asbestos abatement work areas.

F. Thoroughly pre-clean all dust or debris from any fixed objects, floors, or other equipment within the work area using HEPA-vacuuming equipment and/or wet washing. Do not use brooms, brushes, mops, or non-HEPA vacuum cleaners for this pre-cleaning work. Seal all seams, joints, covers or casings with tape, and enclose fixed objects or equipment with a minimum of two layers of 6-mil plastic sheeting secured and sealed airtight with duct tape.

G. Cover walls with two (2) layers of 6-mil polyethylene sheeting. Use strapping to secure 6-mil polyethylene sheeting to walls where needed. Joints in plastic sheets shall be taped and glued in a manner to prohibit air movement, and to prevent passage of water or other liquids. Any floor drains or other openings shall be sealed individually with two (2) layers of 6-mil sheeting and tape. Pits, sumps, and other openings shall be covered with plywood sheathing secured so as to prevent a tripping hazard and then covered with two (2) layers of 6-mil sheeting.

H. Install work area HEPA-filtered exhaust systems as previously specified.

I. Warning Signs: The Contractor shall post warning signs in English meeting the requirements of OSHA 29 CFR 1926.1101 at the outside doorway to the decontamination facility which shall be the only non-emergency entrance into the work area. The Subconsultant may also request that the Contractor post additional warning signs around the work area or at other potential entrances or exposure points. Warning signs shall be readily visible to any person attempting to enter the work area.

J. Access Restrictions: The Contractor shall restrict access to work areas to persons who have previously been identified to the Subconsultant; or persons who have legal jurisdiction over

the work. The Contractor's Supervisor shall at all times monitor the entrance to the decontamination facility to prevent unauthorized people from entering, and to maintain a written log of all people entering the work area.

3.03 APPROVAL OF PREPARATION WORK

A. After each asbestos removal work area has been prepared as specified above, the Contractor shall request a formal site inspection by the Subconsultant. No pre-cleaning, removal, demolition, or other disturbance of asbestos-containing materials, dust, or debris shall occur until the Subconsultant has inspected and accepted the site preparation work.

3.04 ASBESTOS REMOVAL UNDER GENERAL CONTAINMENT PROCEDURES

A. This section covers the removal of asbestos-containing materials where conducted inside of a removal area which has been isolated and protected with polyethylene coverings, and has a HEPA-exhaust system and 3-room decontamination facility.

B. Amended water (wetting agent), mixed and carefully applied using an airless sprayer as specified by the manufacturer, shall continuously be used to control the release of asbestos fibers from the friable material prior to and during removal. The amended water shall be applied in sufficient quantity to fully penetrate and saturate the friable material before it is removed. Where necessary, wetting shall commence up to 24 hours before removal work to ensure effectiveness.

C. Removal:

1. No asbestos removal work shall begin until the work area has been prepared to the satisfaction of the Subconsultant as summarized in preceding Sections. Removal workers shall wear respirators and protective clothing as previously described throughout all removal, cleanup, and waste handling operations.

2. Small test patches of asbestos material shall be wetted, and then removed and examined to determine degree of saturation prior to removing the bulk of the material. The Contractor may use removal encapsulants instead of amended water; applied per manufacturer's and federal guidelines. Use of high rpm power equipment pressure washers or hydro-blasters for removal of asbestos materials is not acceptable. Hoses used for washdown shall be limited to a certain size and psi as specified herein.

3. After large areas of the asbestos material have been fully wetted and tested, the asbestos shall be carefully removed in small sections by hand using scrapers or other suitable tools.

4. As the material is removed, it shall be promptly wetted and packed into impermeable, labeled 6-mil polyethylene disposal bags and/or appropriate disposable drums. When each bag is full, the packaged material shall be sprayed with amended water, sealed, and transported to a temporary storage area inside of the work area. Accumulations of standing or free water shall not be allowed to collect on the work area floor.

5. If the asbestos material is located on surfaces higher than 15 feet above the floor, the

Contractor shall provide closed chutes (with maximum incline of 60 degrees from horizontal), or scaffolding for waste containers to prevent dropping material down to the floor during removal.

6. The Contractor shall repeatedly mist the work area and spray the friable material to prevent it from drying out. Metal shovels shall not be used to pick up or move waste on a floor.

7. Once the majority of the asbestos is removed, the Contractor shall scrub the substrate surface and then thoroughly wash all surfaces to remove all remaining material.

8. The Contractor shall not be permitted to seal substrate surfaces from which asbestos material was removed with lockdown encapsulants.

9. The Contractor shall minimize contamination of the work floor, the exterior of disposal containers, and all other surfaces within the work area. At the end of each shift, all surfaces shall be cleaned of all materials and then HEPA-vacuumed or wet mopped and all debris packaged in 6-mil polyethylene bags.

10. The decontamination facility shall be wet cleaned twice per shift using wet cleaning methods upon completion of any waste removal.

11. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.

E. After all indicated asbestos materials have been removed, perform exploratory demolition of building components and equipment as directed by the Subconsultant to confirm that all accessible asbestos materials have been identified and removed.

3.05 ASBESTOS REMOVAL USING GLOVEBAG ENCLOSURE

A. This Section pertains to the removal of asbestos pipe and pipe fitting insulation using the glovebag technique in areas where appropriate.

B. Bags commercially manufactured specifically for glove bag enclosure removal of asbestos shall be used, subject to Subconsultant's approval. All bags shall be minimum of 7-mil clear PVC or polyethylene, appropriately sized for the removal area and task. "Profo-Bag" as manufactured by Asbestos Control Technology, Inc., Cherry Hill, N.J. is recommended, and use of other types may be in infringement of U.S. Patent No. 4,626,291."

C. The Contractor shall provide and utilize the following materials and equipment for this work: amended water, duct tape, plastic sheeting and waste bags, minimum of half mask passive respiratory protection, disposable coveralls, warning signs, HEPA-filtered vacuum cleaner, utility knife (retractable blade), tin snips as required for aluminum jacket, wire cutters (as required for wire reinforcing), industrial stapler (Bostitch or equivalent), nylon brush, and airless sprayer (equipped with + 3 LF of maximum 3/16" I.D. flexible tubing at end of wand for insertion into glove bag), chisels and wire brushes, etc.

D. Precautions:

1. Install critical isolation barriers and decontamination facility as specified herein. Establish negative air pressure within work area as specified herein. Provide one layer of 6-mil fire retardant polyethylene sheeting on floor and fixed items (polyethylene sheeting on walls is not required).

2. Provide supplementary lighting as required.

3. Contractor shall provide a crew of two (2) or more well trained persons for each glove bag removal project. One member of the crew shall be dedicated to ensuring that the glove bag is secured to the component.

E. Preparation:

1. Pipe, Small Duct, Other Wrappable Components: Place necessary tools in bag. Wrap bag on pipe, seal with staples and tape leaving enough sealed space above pipe to allow easy access. Secure bag to pipe to support weight of stripped insulation and water (additional support for the bag may be provided by a chair or ladder, or by suspension).

2. Insert HEPA-vacuum nozzle and flexible tubing of wetting agent sprayer into hole location provided; seal airtight with duct tape.

3. Smoke Test: Subconsultant shall inject smoke via a small hole and slowly squeeze bag. Repair leaks and holes as required.

F. Removal Procedure:

1. During removal, periodically wet the inside surfaces of bag and any waste for better visibility and fiber control. Use cold water to prevent fogging.

2. During removal, periodically use HEPA-vacuum to compensate for any leaks and to reduce airborne fiber levels.

3. Cut the insulation sharply for neat sealing of exposed insulation. Leave 4" minimum margin at the bag seal point for safety.

4. After removal and brushing, wash down all surfaces to below the levels where the bag will be sealed, and saturate the waste. Look for residue in folds, on the back side of pipe, etc.

5. Gather tools in a glove hand and pull the glove inside out. Seal the arm with + 6" tape and cut through the middle of the tape. Bend and re-tape the ends. Save the "bagged" tools for the next bag operation or clean by placing in pail of water.

6. Collapse the bag with the HEPA-vacuum. With vacuum still applied, seal the bag just above the glove level. Remove the nozzle and tubing. Place a 6-mil waste bag

over the glove bag and then carefully remove the glove bag from the component and immediately seal it in the waste bag. Check the component for loose waste and vacuum as required.

7. If no additional removal is planned, the glove-enclosed tools shall be immersed in a pail of water, opened and cleaned. (Rags and/or sponges can be used to clean other tools, but cannot be salvaged.) The water and other debris shall be disposed of as asbestos waste.

3.06 REMOVAL AND DISPOSAL OF ASBESTOS ROOFING AND FLASHING MATERIALS

A. This paragraph specifies the removal, handling, and disposal of asbestos-containing asphaltic and felt built-up roofing, flashing, tar, and other roofing products. The term roofing materials, as used in this Section, refers to all ACM roofing, flashing, tar etc. products found at the site. Use all appropriate care when working on the roof.

B. As part of the Plan of Action (see Paragraph 1.04(A)(4)), the Contractor shall submit roofing materials removal plans for review and acceptance.

C. Removal of the roofing materials shall be performed in accordance with all applicable OSHA, DEP, EPA, and MDLWD regulations and policy statements.

D. Removal of roofing materials will be in a manner that minimizes overall destruction of the roofing components and ensures that no visible emission of asbestos or other dusts occurs. Roofing materials cannot be drilled, sawed, or mechanically abraded in any fashion.

E. Once removed from the substrate, roofing materials will be immediately prepared for transportation to the approved landfill. The contractor shall removed no more roofing material than can be transported from the site by the end of daily operations. Stockpiling or roofing materials on site is not permitted.

F. Roofing materials will be handled in accordance with the following:

1. Roofing materials will be maintained in a wet condition during all handling/removal procedures.

2. Large roofing material components will be placed into approved dumpsters or transport vehicles immediately upon removal from the building.

3. All roofing material debris or rubble (items small enough to be placed into standard asbestos disposal bags) will be bagged and labeled for disposal as asbestos waste.

G. Transportation and disposal of roofing materials will be as specified in this Section, 310 CMR 18.00-19.00, other applicable regulations, and the following:

1. Contractor shall provide the following types of waste dumpsters:

a. Fully enclosed units for all roofing material that is bagged or wrapped and labeled for disposal as asbestos waste.

b. Fully enclosed or covered open-top units for large, unwrapped sections of roofing material.

2. All roofing material that is bagged or wrapped and labeled as asbestos waste will be disposed of at a landfill approved for disposal of asbestos waste. Large, unwrapped sections of roofing material may be transported to an approved landfill and disposed of as general demolition debris, provided the landfill will accept such waste. All open-top dumpsters into which roofing material has been placed will be removed from the work site by the end of the daily operations and transported to the approved landfill site.

H. Subconsultant will visually inspect the roof and roof components for any remaining ACM roofing materials. Contractor shall clean-up any remaining debris/residue to the point of no visible debris, as required by Subconsultant.

3.07 REMOVAL OF ASBESTOS FIRE DOORS

A. Removal of Fire Doors shall be in accordance with all applicable regulations. At a minimum, the following work practices shall apply:

1. Workers shall wear protective clothing and half-mask, dual-cartridge, HEPA-filtered respirator, at a minimum.

2. The work area shall be isolated as required by regulations and to the satisfaction of the Consultant.

3. Place polyethylene sheeting around area where items are being removed.

4. Wet and remove items with minimal breakage.

5. Immediately wrap items in two layers of polyethylene sheeting.

6. Properly wet and double bag for disposal.

7. Dispose all asbestos-containing waste in an EPA and MA DEP approved landfill.

3.08 SELECTIVE DEMOLITION AND REMOVAL OF ADDITIONAL SUSPECT ACM

A. Selective demolition to check for additional ACM suspected to exist at the site shall be performed by Contractor to the extent required by Subconsultant. Contractor shall construct a total isolation work area at each point of selective demolition if the demolition cannot be performed in a manner which would not disturb the suspected materials.

B. Removal of asbestos (if confirmed by the Subconsultant's bulk sampling) found during selective demolition and not included in the description of work in Paragraph 1.1 of this Section, will be performed according to this Specification, applicable regulations, and appropriate work plans acceptable to the Authority.

3.09 ASBESTOS WASTE DISPOSAL PROCEDURES

A. The Contractor shall package, label, and remove all asbestos waste (including asbestos waste cross contaminated by other hazardous materials) from the work area as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. Transportation and disposal of the containerized waste at an approved landfill shall be the responsibility of the Contractor.

B. Definition: Wastes are defined as all asbestos-containing or potentially contaminated materials or other items which have not been completely cleaned or sealed to the satisfaction of the Subconsultant while on the work area, and must be removed from the job site. Asbestos wastes may include building materials, insulation, disposable clothing and protective equipment, plastic sheeting and tape, exhaust systems or vacuum filters, contractor equipment, or other materials designated by state or local authorities or the Subconsultant which have been potentially contaminated with asbestos and have not been fully cleaned.

C. Waste Labeling:

1. Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA and Department of Transportation requirements, shall be affixed to or printed on the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible.

2. In compliance with NESHAPS, 40 CFR, Part 61.150, all waste containers or bags shall be labeled with the following generator information:

   - Name of waste generator.
   - Location of where waste was generated.

D. Wetting of Waste: A fine water spray shall be used to keep the top layers of waste in containers thoroughly wet at all times. When a waste bag is full, air within the bags shall be evacuated with a HEPA equipped vacuum and be securely sealed with tape or other secure fastener.

E. Waste Container decontamination and Removal Procedures: The following procedures shall be followed whenever containers or equipment are removed from the work area.

1. The clean room shall be considered a holding area only during the period of active waste transfer for the purpose of the loading of carts or drums. Storage of waste and carts (or drums) in the clean room is prohibited.

2. Waste removal shall not occur during worker shift changes or when workers are showering or changing. Care shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room when used for waste removal.

3. Workers are to be stationed in each room/area of the decontamination facility to transfer the containers and equipment to or from adjacent sections. These workers shall not cross the airlocks into the adjacent areas/rooms until the waste or equipment transfer is finished for that period and the workers have gone through

decontamination as required by these Specifications. The workers in the clean room or holding area shall enter from uncontaminated areas with appropriate personal protective equipment; or prior to the start of waste transfer, these workers shall exit the work area, fully decontaminated, and subsequently don clean personal protective equipment.

4. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the decontamination facility airlock. Workers shall not enter the airlock during this procedure.

5. The containers of waste and the equipment shall be removed from the airlock by workers stationed in the washroom during waste removal operations.

6. Once in the washroom, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.

7. The cleaned containers of waste and equipment shall be placed in uncontaminated leak-tight plastic bags (or 6-mil sheeting if physical characteristics necessitate and permit). Air volumes shall be minimized, and the bags or sheeting shall be sealed.

8. The clean re-containerized items shall be moved into the airlock for subsequent transfer to the holding area. The washroom workers shall not enter this airlock or the work area until waste removal is finished for the period.

9. Re-containerized items and cleaned equipment shall be removed from the airlock to the holding area by workers who have entered from uncontaminated areas with appropriate personal protective equipment.

10. The re-containerized items of waste and cleaned, bagged equipment shall be placed in closed top, watertight plastic carts or drums. These carts or drums shall be held in the holding area pending removal. The carts or drums shall be HEPA-vacuumed or wet-cleaned following the removal of the containers of waste from them.

11. The exit from the decontamination facility shall be monitored and secured at all times to prevent unauthorized entry.

12. The carts or drums may be temporarily stored in a holding area at the work site outside the workplace until a transport vehicle arrives, but such storage areas must be acceptable to the Subconsultant.

F. If a separate equipment and waste decontamination unit is provided, take all equipment and waste material from the work area through the decontamination facility according to the following procedures:

1. Thoroughly wet clean contaminated equipment or waste container in work area and pass into Wash Room.

2. Once inside the wash room, wet clean equipment or waste containers. Place poly

bags in a second clean poly bag. Wrap large items in a second layer of 6-mil poly.

3. When cleaning is complete, pass items into holding area. Worker stationed in Wash Room shall not enter the holding area. This worker shall exit via the work area through the personnel/decontamination facility.

4. Require worker stationed in holding area to wear full protective clothing and appropriate respiratory protection. These workers shall not enter the waste wash area.

G. Guidelines For The Use And Decontamination of Fiber Drums: (These procedures apply to the use of fiber drums only.)

1. Prior to fiber drums entering the work area, the drums should be prepared in the following manner:

   a. Place the drum in a two (2) mil minimum plastic bag

   b. Fold the top of the bag over the top of, and into the drum.

   c. Seal the bag to the inside of the drum using tape and/or spray on adhesive.

   NOTE: The bag must be sealed entirely to the inside of the drum prior to the drum being brought into the work area.

2. In the work area, any material which is likely to puncture or tear a 6 mil polyethylene bag (i.e., fire brick, demolition debris) shall be double bagged in 6 mil polyethylene bags, sealed and placed inside the drum.

3. Prior to removing the filled drum from the work area, the metal lid shall be applied to the top of the drum and fastened either with a locking-ring or with duct tape.

4. The drum shall be cleaned and wet-wiped in the work area, then passed through the air lock into the waste wash room of the waste disposal decontamination enclosure system.

5. Cut the bag at the top of the drum directly underneath the lid. Remove the drum from the bag and dispose of the bag as ACM.

6. Wet-wipe the metal lid of the drum and pass it through the air lock into the holding area of the waste decontamination enclosure system.

7. At this time, the appropriate warning labels shall be applied to the drum and the drum may be removed for disposal.

H. Use of Gaylord boxes for waste disposal shall only be permitted for asbestos waste where specifically identified in the Contractor's Work Plan and approved by the DEP and Subconsultant. The Work Plan shall describe in detail the proposed Gaylord boxes and waste

loading procedures. Gaylord boxes shall be double lines with 6 mil polyethylene sheeting and be properly sealed, labeled, etc. The Subconsultant may choose to disallow the use of Gaylord boxes at any time that do not meet the detail provided in the Work Plan, or if the work is found to deviate in any way from the Work Plan, or if damaged boxes are found being used at the site, or if the boxes are found to be leaking. If the use of Gaylord boxes is disallowed by Subconsultant, all waste found in such boxes shall immediately be properly repackaged into acceptable containers in the work area at Contractor's own expense.

I. Waste Container Storage: The container used for the storage of bagged contaminated waste shall be an enclosed dumpster. Dumpster shall have a solid metal roof, solid metal door with padlock. Line the cargo area with two layers of a 6 mil polyethylene sheeting to prevent contamination from damaged or leaking containers. Floor sheeting shall be installed first and shall extend up the sidewalls 24 inches minimum. Wall sheeting shall be overlapped and taped securely into place. No unbagged contaminated waste or non-asbestos waste shall be stored in these dumpsters. Ensure that bags placed in dumpsters are undamaged. Warning signs shall be posed on the dumpster in accordance with Sections 29 CFR 1926.1101 of the OSHA regulations.

J. Waste Removal Scheduling: All waste containers shall be decontaminated and removed from the site before final cleanup is started and isolation barriers are taken down. The Contractor must pre-schedule and obtain the agreement of the Subconsultant for all time periods Contractor desires to remove waste bags from the facility. The Subconsultant must observe removal of all waste containers to verify their condition and estimate the total volume of waste material (to the nearest cubic yard). Contractor shall then insert the quantity on the Disposal Certificate and a hazardous waste manifest (if required), and arrange for the original of these forms to accompany the waste as it is transported to the landfill.

K. Waste Transportation And Disposal Regulations: It is the responsibility of the Contractor to determine and insure that he is complying with: 1) the current waste handling regulations applicable to each work site; and 2) the current regulations for transporting and disposing waste at each ultimate disposal landfill. The Contractor must comply fully with these regulations; and with all U.S. Department of Transportation, state, local, and EPA requirements. Where required, the Contractor's waste hauler and disposal contractor shall maintain a valid hazardous waste transporter's permit and identification number; and obtain, complete, and fully comply with any other local hazardous waste manifesting requirements. A copy of all manifest forms shall be sent to the Authority after disposal is completed and all required data and signatures have been obtained. The Contractor shall return the original Disposal Certificate within 10 working days of waste shipment from the site and within the timeframes required by applicable regulations.

3.10 CLEANING AND FINAL DECONTAMINATION

A. This section applies to cleaning all work areas where asbestos removal work has been performed. After all asbestos-containing (or contaminated) materials have been removed, the Contractor shall remove all wastes and perform a thorough final cleanup and decontamination of each work area per the methods indicated below. Final cleaning shall be performed only after all waste is packaged and removed, but prior to dismantling any barrier, decontamination facility, or protective coverings. Cleaning shall be subject to the Subconsultant's acceptance based on a visual inspection (including surface dust wipe tests if appropriate) and air testing

performed using NIOSH Method 7400. HEPA-exhaust systems shall operate continuously throughout the cleaning and air testing processes until the Subconsultant agrees to their shutdown and removal from the site. The Contractor shall notify the Subconsultant in writing at least 12 hours in advance of the expected completion time of site cleaning in order to allow the Subconsultant to schedule air clearance testing.

B. Methods and Approvals: Cleaning methods and approvals shall consist of the following tasks performed in the listed order:

1. Remove all visible accumulations of asbestos debris on the protective coverings on floors, walls, and other surfaces, and then HEPA vacuum all surfaces to pick up excess water and gross saturated debris. A wet-dry shop vacuum, dedicated to asbestos abatement, may be used before HEPA vacuuming.

2. After HEPA-vacuuming, the work area air shall be lightly misted, and then all protective coverings on ceilings, walls, floors, and other items in the work area shall be wiped thoroughly clean (first cleaning).

3. After the Contractor has completed the above steps (1) and (2), Contractor shall request the Subconsultant to inspect the site. To facilitate scheduling of this inspection, the Contractor shall notify the Subconsultant of the anticipated completion time of the above initial cleaning work 12 hours in advance.

4. If the Subconsultant observes any asbestos waste, debris or fibers within the work area during the inspection, the Contractor shall perform additional cleanup and decontamination.

5. If the Subconsultant accepts the first cleaning, the waste bags shall then be removed from the work area using the procedures described herein. The bottom layer of protective poly coverings, the Decontamination Facilities, the HEPA exhaust systems and all barrier walls shall remain in place and in use. The Contractor shall not apply any encapsulants to any surfaces except where noted herein.

6. Carefully remove the upper layer of all protective poly coverings on walls and other surfaces and package them in 6-mil waste bags. After these upper protective coverings are removed, the work area shall be completely vacated for at least twelve (12) hours to allow fiber settling while the Subconsultant collects and analyzes an initial set of air samples according to NIOSH Method 7400 (PCM).

7. The Contractor shall then perform a second cleaning of all surfaces in the work area by HEPA-vacuuming and wet washing. Upon the acceptance of the Subconsultant, all remaining protective poly coverings shall be carefully removed and disposed of as described herein. However, the barrier walls, decontamination facilities, HEPA-exhaust systems, and primary isolation seals shall remain in place and in use. The Contractor shall then perform a third cleaning of all surfaces in the Work Area.

8. After successful completion of the final air clearance testing, the Contractor shall carefully remove the decontamination facilities and any temporary barrier walls or tunnels. The HEPA-exhaust systems shall be removed only after all other items are

removed. A HEPA-vacuum shall be kept on-site during this final disassembly work to cleanup any dust or debris.

9. If any of the PCM air sample results are above 0.01 fibers/cc the Subconsultant may require additional cleaning and decontamination; and the above inspection and air tests shall be repeated by the Subconsultant.

10. Workers shall wear approved respiratory and personal protective equipment throughout all cleanup and waste disposal activities.

3.11 ELECTRICAL WIRING WRAP REMOVAL

A. Removal of these materials must be performed in a manner that precludes the creation of visible dust or any asbestos from becoming airborne. No sanding, grinding, or mechanical equipment is permitted to be used in removing these materials. Wet the material and remove using hand tools only. All wiring wrap shall be removed, bagged and disposed in accordance with this Section.

C. Work area enclosures are not required, however, a regulated area shall be set up, and polyethylene sheeting placed around the area of work at each removal location. Any debris or loose pieces of wrap shall be collected and bagged for disposal each shift.

D. Workers shall wear protective clothing and respiratory protection suitable for this work activity.

E. Where staging, scaffolding and/or mechanical lifts are used to access the ACM, the working surfaces shall be protected from contamination.

3.12 MONITORING, TESTING AND INSPECTION

A. The performance and execution of the work will be closely and continuously monitored by the Subconsultant. Monitoring required to demonstrate compliance with OSHA regulations is the responsibility of the Contractor. The monitoring work shall be performed both inside the work area and the surroundings to ensure full compliance with these Specifications. The Contractor shall provide full cooperation and support to the Subconsultant throughout the work. Monitoring and inspections shall include air samples in the workspace, air samples in the areas surrounding the work area and the outside, checking of the Contractor's standard operating procedures, engineering controls, respiratory protection equipment, packing, packaging, transporting and disposal of asbestos, decontamination facilities and procedures, and any other aspects of the abatement process that may impact the health and safety of the people and the pollution of the environment.

B. The Authority shall bear all cost in connection with the air sampling performed by the Subconsultant for the initial analyses. However, all costs of all subsequent laboratory analyses and Subconsultant's labor taken because a final visual inspection was not satisfactory or the limits specified (i.e., 0.01 f/cc) were exceeded on the initial air clearance or other type of tests, shall be borne by the Contractor.

3.13 AIR MONITORING BY SUBCONSULTANT

A. This paragraph describes air monitoring carried out by the Subconsultant to verify that the building beyond the work area and the outside environment remain uncontaminated (from asbestos dust and airborne levels of 0.01 f/cc). This Section also sets the action required by the Contractor if an OSHA permissible exposure level is met or exceeded. The Subconsultant will be conducting air monitoring during the course of the Project. In no way shall this monitoring replace that required of the Contractor.

B. All perimeter air sampling and analysis will be performed by the Subconsultant. A complete record of all air monitoring tests and results will be furnished to the MBTA.

C. Personnel air monitoring required by OSHA is work of the Contractor and is not covered in this paragraph.

D. Work Area Isolation: The purpose of the Subconsultant's air monitoring will be to detect faults in the work area isolation such as:

- Contamination of the building outside of the work area with airborne asbestos fibers,
- Failure of filtration or rupture in the negative pressure system,
- Contamination of the exterior of the building with airborne asbestos fibers.

Should any of the above occur, the Contractor shall immediately cease asbestos abatement activities until the fault is corrected. Work shall not recommence until authorized by the Subconsultant .

E. Work Area Airborne Fiber Count: The Subconsultant will monitor airborne fiber counts in the work area. The purpose of this air monitoring will be to detect airborne fiber counts which may significantly challenge the ability of the work area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.

F. Work Area Clearance: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Subconsultant will sample and analyze air per this Section and 453 CMR 6.00, using either PCM or TEM analysis as determined by the Subconsultant.

G. Airborne Fiber Counts:

1. Inside Work Area: Maintain an average airborne count in the work area of less than 0.5 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds 1.0 fibers per cubic centimeter, stop all work, leave negative air system in operation and notify Subconsultant. Do not recommence work until authorized in writing by Subconsultant. If airborne fiber counts exceed 2.0 fibers per cubic centimeter for any period of time, cease all work until fiber counts fall below 0.5 fibers per cubic centimeter and notify Subconsultant. Do not recommence work until authorized in

writing by the Subconsultant.

2. Outside Work Area: If any air sample taken outside of the work area exceeds 0.01 f/cc immediately and automatically stop all work. If this air sample was taken inside the building and outside of the critical barriers around the work area, immediately erect new critical barriers as specified herein to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g., wall, ceiling, floor).

   a. Decontaminate the affected area in accordance with these Specifications.

   b. Respiratory protection shall be worn in affected area until area is cleared.

   c. Leave Critical Barriers in place until completion of work and insure that the operation of the negative pressure system in the work area results in a flow of air from the balance of the building into the affected area.

   d. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a temporary decontamination facility consisting of a Shower Room and Changing Room as specified herein. After cleaning and decontamination of the affected area remove the Shower Room and leave the Changing Room in place as an air lock.

   e. After certification of visual inspection in the work area remove critical barriers separating the work area form the affected area. Final air samples will be taken within the entire area.

H. Fibers Counted: The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts. "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the NIOSH 7400 Procedure. If work has stopped due to high airborne fiber counts, air samples may be secured in the same area by the Authority for analysis by Transmission Electron Microscopy (TEM). "Airborne Fibers" counted in samples analyzed by TEM shall be only asbestos fibers, but of any diameter and length, and will be analyzed and reported consistent with the applicable regulations and practices.

3.14 AIR MONITORING BY CONTRACTOR

A. The Contractor shall perform air monitoring as required to meet OSHA Requirements for maintenance of Time Weighted Average (TWA) fiber counts for types of respiratory protection provided. Subconsultant will not be performing air monitoring to meet these OSHA requirements.

B. The sampling person and analysis laboratory performing this work shall be an independent party not financially or managerially connected to the Contractor, acceptable to the Subconsultant, and shall meet all requirements of 453 CMR 6.00 and this Specification.

C. The laboratory shall be successfully participating in the AIHA/NIOSH Proficiency Analytical

Testing (PAT) program and be certified by the Commonwealth of Massachusetts.

D. Air sampling materials and equipment requirements are as follows:

1. Sampling for analysis by phase contract microscopy shall employ cellulose ester collection filters with 0.8 micron pore size or less. Cassettes shall be loaded with filters under clean laboratory conditions. A 5.0 micron pore-size cellulose ester backing filter shall be placed behind the collecting filter, followed by the cellulose support pad and the cassette base. A metal cowl or an electrically conductive cowl shall be used in conjunction with the sampling train.

2. The filter assembly shall be upstream of all other components in the sampling train. An air flow measuring device (when used) shall be downstream of the filter and the pump assembly, or integral with the pump assembly.

3. Sampling pumps shall supply constant flow.

4. An air flow measuring/metering device shall be used, and shall be high quality rotometer, mass flow, dry gas meter or critical orifice. Measuring devices shall have a range of at least 1.5 times the desired flow rate and be readable to at least + 5% of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling. The calibrations shall be recorded.

E. Numbers and frequencies of personal air sampling shall be as required by OSHA regulations but not less than one (1) sample per eight (8) hour work shift during times of asbestos removal work.

F. Results of sample analysis shall be provided to the Subconsultant within twenty-four (24) hours of collection.

G. The Contractor shall use a pre-approved "chain-of-custody" form for all personal air samples he collects.

H. Personal sampling, including all costs, shall be the complete responsibility of the Contractor.

3.15 FINAL VISUAL INSPECTION AND WORK AREA CLEARANCE

A. Upon completion of removal work, but prior to commencing encapsulation or cleaning of the work area, the Contractor shall request the Subconsultant to conduct a final visual inspection for any visible debris.

B. Following a successful final visual inspection, the final clearance testing shall take place using aggressive air sampling techniques as specified in 453 CMR 6.00. The Contractor shall supply and operate additional circulating fans and leaf blowers as directed by the Subconsultant during this final testing to ensure effective air circulation. The final test shall consist of taking PCM or TEM air samples in the work area, and analyzing the samples per 453 CMR 6.00.

C. Surface wipe and/or bulk samples may also be taken and analyzed at the option of the Subconsultant to confirm that all microscopically detectable asbestos has been removed. If the results of the final visual inspection or final air testing are not satisfactory, thorough wet cleaning and/or HEPA vacuuming shall be repeated until the required decontamination levels are achieved. The Contractor shall bear all costs for additional inspections, testing, and cleaning until the area passes final air testing.

D. After achieving the level of cleanliness and decontamination as specified herein and as confirmed by the final inspections and testing, the Contractor shall carefully remove the decontamination facilities and any temporary barriers and DF's. Use HEPA vacuums during final disassemble work to cleanup any dust or debris.

E. The Contractor shall at no additional charge install and provide AC power, outlets, and extension cords for the Subconsultant to collect the area and final air clearance samples as required herein.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Separate measurement will not be made for Asbestos Removal, but all cost in connection therewith shall be paid as an allowance based upon the approved Contract, except as otherwise noted.

B. Measurement for the removal and disposal of identified asbestos shall be a lump sum under ASBESTOS REMOVAL. Payment as a lump sum based upon the approved Contract shall be full compensation for all labor, materials and equipment necessary for the removal, transportation, hauling and disposal of waste classified as asbestos waste.

C. Measurement for removal of suspect/unidentified asbestos shall be an allowance under ASBESTOS REMOVAL. Payment as an allowance based upon the approved Contract shall be full compensation for all labor, materials and equipment necessary for the removal, transportation, hauling and disposal of waste classified as asbestos waste.

4.02 PAYMENT

A. Asbestos Removal will be paid as an allowance based upon the approved Contract as specified above.

B. Removal of identified asbestos materials will be paid for as a lump sum, which price and payment shall be full compensation for furnishing all material, labor, equipment, tools and accessories necessary to complete the work.

C. Removal of suspect and/or unidentified asbestos materials will be paid for as an allowance, which price and payment shall be full compensation for furnishing all material, labor, equipment, tools and accessories necessary to complete the work, provided the required sampling indicates the materials are asbestos.

4.03 PAYMENT ITEMS

ITEM NUMBER	DESCRIPTION	UNIT
0212.177	ASBESTOS REMOVAL	LS
0212.174	ASBESTOS REMOVAL	AL

END OF SECTION

SECTION 02081

SOIL MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Work of this Section consists of all labor, equipment, materials, and services for field screening, stockpiling, segregating, tracking, transporting, and disposing of excavated soils.

B. Soil sampling conducted at the Site to date indicates soils in the project area are impacted with total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAH), in excess of the applicable Massachusetts Contingency Plan risk based standards or reporting concentrations established in the Massachusetts Contingency Plan (MCP) Sections 40.0900 and 40.1600, respectively. The Contractor may encounter these materials when performing Work covered by this Section.

C. The Authority will be the generator and will sign all disposal facility waste profiles, hazardous waste manifests and bills of lading as the Generator; the Contractor's LSP will sign all Bills of Lading as the LSP. Except for soil transported under manifest, all soil shall be transported under 21E Bills of Lading regardless of the chemical quality of the soil.

D. Work covered by this Section shall include furnishing, operating, and maintaining equipment decontamination stations for the duration of excavation activities and dismantling, disposing of decontamination stations at project completion. Decontamination stations shall be capable of eliminating the dispersion of dust and mud by vehicles exiting the site.

A. This Specification is based on the use of a combination of procedures for excavated soil management:

1. Excavation directly into transport vehicles for off-site disposal for soils previously assessed by in-situ characterization.

2. Excavation and stockpiling of soil, followed by characterization of the stockpiled soil prior to transport and disposal.

1.02 RESPONSIBILITIES

A. Contractor's Responsibilities

1. The Contractor shall field screen excavated material for the presence of volatile organic compounds (VOCs) with a photoionization detector. Samples representative of each 50 cubic yards of material excavated shall be screened.

2. The Contractor shall be responsible for the submission of daily logs summarizing field screening and excavating activities.

3. The Contractor shall be responsible for the collection and analysis of soil samples from

all areas of the Site that have not been previously classified for disposal. Soil samples shall be collected in-situ to allow for the loading of soils directly into trucks for transportation from the Site.

4. Unless transportation of soils off-site occurs concurrently with excavation activities, all excavated material shall be stored on site prior to characterization and transport for disposal.

5. The Contractor shall identify and propose landfills, soil recycling and hazardous waste treatment, storage and disposal facilities for excavated material characterized for off-site disposal.

6. The Contractor shall be responsible for transporting excavated material to the approved landfill, soil recycling and/or hazardous waste treatment, storage and/or disposal facility.

7. At the direction of the Consultant, the Contractor shall furnish, operate and maintain equipment decontamination stations for the duration of excavation and soil disposal work.

8. The Contractor shall develop and implement site-specific emergency response and health and safety protocols and procedures.

9. For each shipment of soil transported to a disposal facility, the Contractor shall demonstrate that he has selected the least costly means of disposal. This demonstration shall be made prior to shipment.

10. The Contractor shall be responsible for submitting completed Bills of Lading, hazardous waste manifests and other shipping documents to the Engineer within two weeks of shipment to a disposal/recycling facility.

11. The Contractor shall advise the Consultant at least three working days in advance of the schedule for off-site disposal of excavated material.

12. Should soils be stockpiled on site, the Contractor shall collect, analyze and characterize samples of excavated material prior to on-site reuse or off-site reuse, recycling and/or disposal.

13. The Contractor shall represent the Authority as the Licensed Site Professional (LSP). The Contractor shall prepare the necessary documents to transport and dispose of excavated material. These documents include, but are not limited to, waste profiles, bills of lading, hazardous waste manifests, Release Abatement Plans and associated Status Reports. The Massachusetts Department of Environmental Protection (DEP) was notified of a release of oil and/or hazardous materials at the Site in a Release Notification Form submitted on October 1, 2003. The Contractor's LSP shall be responsible for conducting response actions at the Site in conjunction with the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000.

14. The Contractor shall submit the executed transportation and disposal documents to the appropriate local, state and federal agencies.

15. The Contractor will provide an environmental field technician to oversee the loading of

excavated material into transport vehicles for off-site disposal/recycling.

B. Engineer's Responsibilities

1. The Engineer will review and approve all required DEP submittals.

C. Authority's Responsibilities

1. The Authority will review and approve the proposed facilities selection of off-site recycling, reuse or disposal facilities.

2. The Authority shall be the designated Generator for excavated material identified for off-site reuse, recycling and/or disposal.

1.03 APPLICABLE REGULATIONS

A. All regulations cited and those of other governing agencies in their most recent version are applicable. This Section refers to many requirements found in these references, but in no way is intended to cite or reiterate all provisions therein or elsewhere. It is Contractor's responsibility to know, understand, and abide by all such regulations and common practices. Other provisions contained in these references may from time to time during the execution of this Contract be enforced by the Authority or the Engineer. In the event of a conflict, the most stringent regulations shall govern. The following documents and/or publications are made part of this Section by reference herein:

1. Massachusetts Contingency Plan (MCP), 310 CMR 40.0000.
2. Massachusetts Hazardous Waste Regulations, 310 CMR 30.00.
3. Solid Waste Management Facility Regulations, 310 CMR 19.00.
4. Site Assignment Regulation for Solid Waste Facilities, 310 CMR 16.000.
5. Draft Interim Policy Regarding the Regulatory Status of Soils Contaminated with Waste Oil of Unknown
6. Origin and/or Hazardous Constituents, DEP Policy No. HW-93-01.
7. Draft Comprehensive Remediation Waste Management Policy, Section I: Regulatory Classification of Remediation Waste, draft DEP policy.
8. Interim Remediation Waste Management Policy for Petroleum Contaminated Soils, DEP Bureau of Waste Site Cleanup Policy No. WSC-94-400.
9. "Construction Activities in Contaminated Areas", draft DEP Bureau of Waste Site Cleanup policy dated April 28, 1994.
10. "Reuse and Disposal of Contaminated Soils at Landfills", DEP Bureau of Waste Prevention Interim Policy No. BWP-94-037.
11. "Hazardous Waste Operations and Emergency Response", Federal Occupational Safety and Health Act (OSHA), 29 CFR 1910.120.
12. "General Regulations for Hazardous Waste Management", EPA, 40 CFR 260.
13. "Regulations for Identifying Hazardous Waste, Hazardous Waste Generators and Hazardous Waste Transporters", EPA, 40 CFR 261, 262 and 263.
14. "Regulations for Owners and Operators of Permitted Hazardous Waste Facilities", EPA, 40 CFR 264.
15. "Interim Status Standards for Owners and Operators of Permitted Hazardous Waste Facilities", EPA. 40 CFR 265.
16. "Standards for Management of Specific Hazardous Wastes and Facilities", EPA, 40 CFR

266.

17. "Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities", EPA, 40 CFR 267.
18. Massachusetts DEP Policy #COMM-97-001.

1.04 DEFINITIONS

A. Solid Waste: Useless, unwanted, or discarded solid, liquid or gas-emitting material from industrial, commercial, mining. agricultural, municipal, or household activities as defined by 310 CMR 16.000 and 19.000. This waste may include demolition waste. This material does not consist of Special Waste as defined by 310 CMR 19.061. Solid Waste may be disposed of in landfills pending applicable local and state approvals.

B. In-State Reuse Facility - An In-State Reuse facility with a DEP approved lining and functioning leachate collection system, permitted to accept petroleum contaminated soil and sediment and operated in accordance with all applicable regulations pertaining to the reuse of petroleum contaminated soil. Petroleum contaminated soil and sediment that has been determined to meet the conditions specified in an In-State Reuse facility's operating permit may be reused at a permitted In-State Reuse facility as daily cover, intermediate cover and pre-cap contouring material. Petroleum contaminated soil and sediment reuse at an In-State facility must be managed in accordance with DEP Policy No. WSC-94-400 titled "Interim Remediation Waste Management Policy for Petroleum Contaminated Soil" and DEP Interim Policy No. BWP-94-037 titled "Reuse and Disposal of Contaminated Soil at Landfills", and shall conform to the requirements of M.G.L.c. 21E and 310 CMR 30.252(2). The reuse facility shall be permitted to accept petroleum contaminated soil and sediment with contaminant concentrations below those specified in the facility's operating permit.

C. In-State Recycling Facility - This type of facility shall be approved by the Commonwealth of Massachusetts to accept petroleum contaminated soil, that would be classified as a hazardous waste in 310 CMR 30.00, if not managed under M.G.L.c. 21E and 310 CMR 40.0000; and is not classified as a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261. The facility shall be permitted pursuant to 310 CMR 30.00 and 310 CMR 19.00 and shall be a hot mix asphalt plant, a thermal processing plant or a cold mix emulsion plant. The facility shall be eligible to accept petroleum contaminated soil provided that the concentrations of contaminants in the soil are below the concentrations specified in the facility's Class A Recycling Permit.

D. Out-of-State Recycling Facility - This type of facility shall be state approved or permitted to accept material that exceeds allowable chemical criteria for In-State recycling, reuse or beneficial reuse or that is defined as a hazardous waste in 310 CMR 30.00, but is not classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261 or TSCA waste as defined in 40 CFR Part 761.

E. Non-RCRA Out-of-State Lined Landfill - This type of landfill shall be state approved or permitted to accept material that exceeds the allowable chemical criteria for in-state recycling, reuse or beneficial reuse or that is defined as a hazardous waste in 310 CMR 30.00, but is not classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR part 261 or a TSCA waste as defined in 40 CFR Part 761.

F. RCRA Landfill - This type of landfill shall accept material that is classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261 but meets the treatment

standards established in 40 CFR Part 268 - Land Disposal Restrictions, or that is defined as a hazardous waste in 310 CMR 30.00, but that is not a TSCA waste as defined in 40 CFR Part 761.

G. Contaminated Soil – For the purposes of this Section, contaminated soil shall be defined as soil containing concentrations of oil and/or hazardous materials at concentrations in excess of RCS-1 Reporting Concentrations, as established by the Massachusetts Contingency Plan (MCP) 310 CMR 40.1600. In addition, all soils removed from within the boundaries of the "Disposal Site" as defined by the MCP 310 40.0006, and established by the LSP based upon sampling data, regardless of chemical composition, shall be considered contaminated.

H. Engineer – For the purpose of this Section, the Engineer shall refer to DMJM+HARRIS or their appointed Subcontractor.

1.05 SUBMITTALS

A. Submit to the Authority for approval at least four (4) weeks prior to the start of any excavation activity a Soil Management and Disposal Plan. The Soil Management and Disposal Plan shall be prepared submitted only after the Asbestos Work Plan (Section 02080) and been submitted and shall evaluate the possibility of encountering asbestos containing soil adjacent to waterproofing materials. Excavation activity shall not commence until the entire plan is approved by the Authority. The Soil Management and Disposal Plan shall include, but not be limited to the following:

1. The name(s) and address(es) of subcontractors retained for Work of this section.
2. A detailed description of Work activities and progress schedule for each phase of the Work associated with excavation, characterization, stockpiling, segregating, tracking, transporting and/or disposing of soil and/or excavated material.
3. Procedures for all soil screening, segregating, stockpiling, and tracking including figure(s) depicting a numbered grid system with areas of excavation and designated stockpiling areas. The Soil Management Plan must establish a procedure which will permit tracking of soil from the point of excavation to the stockpile in order that soil characterization data can be correctly associated with a specific stockpile.
4. Details and design of the decontamination pad including decontamination water collection and disposal procedures.
5. Dust monitoring and control measures.
6. Name, address, telephone number, personnel contact, EPA Identification number, permit, facility-required sample analysis and the waste stream documentation required of each of the following facilities: an In-State Unlined Landfill, In-State Lined Landfill, In-State Recycling Facility, Out-of State Lined Landfill, an Out-of State Non-RCRA Landfill and a RCRA Landfill.
7. Name and location of off-site locations for temporary storage of excavated material. Written confirmation that owner of identified location has permitted the storage of such material.
8. Written confirmation from the reuse, recycling, or disposal facilities that they will accept material from this Contract provided that the material meets the facility permit requirements.
9. Name, address, telephone number, personnel contact, EPA transporter identification number, proof of license, permit and/or authorization to transport hazardous waste in all the affected states.

B. Submit to the Authority for approval at least four (4) weeks prior to the start of any excavation

activity the manufacturer and the specifications for the polyethylene stockpile liner and cover specified in Paragraphs 2.03.A and 2.03.B of this Section.

C. Submit to the Authority for approval at least four (4) weeks prior to the start of any excavation activity the manufacturer, specifications and samples of any material which will be utilized as backfill to support trench and slurry wall excavations.

D. Submit to the Authority for approval at least four (4) weeks prior to the start of any excavation activity a site-specific Hazardous Material Health and Safety Plan. The site-specific Hazardous Materials Health and Safety Plan shall include, but not be limited to the following components as required by OSHA 29 CFR 1926.65(b)(4)(ii):

1. Site Description and Evaluation;
2. Names of Key Site Personnel and alternate responsible for site safety and health;
3. Safety and Health Hazard Assessment and risk analysis for each site task and operator;
4. Education and Training;
5. Personal Protective Equipment;
6. Medical Surveillance;
7. Environmental Air Monitoring;
8. Standard Operating Procedures, Engineering Control and Work Practices;
9. Site Control Measures (Work Zones, Communication and Security;
10. Personal Hygiene and Decontamination;
11. Logs, Reports and Record Keeping;
12. Heat and Cold Stress Monitoring; and
13. Confined Space Entry Procedures.

E. The Contractor shall submit a site-specific Emergency Response Plan to the Authority four (4) weeks prior to the initiation of excavation activities. The Emergency Response Plan shall include, but not be limited to, the following components of OSHA 29 CFR 1926.65(1)(2):

1. Pre-Emergency Planning;
2. Personnel Roles, lines of authority and communications;
3. Emergency Recognition and Prevention;
4. Safe Distances and Places of Refuge;
5. Site Security and Control;
6. Evacuation Routes and Procedures;
7. Decontamination;
8. Medical treatment and First Aid;
9. Emergency Alerting and Response Procedures;
10. Critique of Response and Follow-up; and
11. Personal Protective Equipment and Emergency Equipment.

F. Submit to the Engineer for review and approval, all documents required by the MCP 310 CMR 40.0000 at least four (4) weeks prior to submission to the Massachusetts DEP. The Contractor shall be responsible for the collection of necessary signatures (as applicable) from the Authority and for the submission of documents within the timeframe established by the MCP.

G. Submit to the Authority at the end of each day a daily log detailing excavation activities including location and volume with corresponding stockpile or grid identification number for each day. Indicate source(s) of material.

H. Submit to the Authority within ten days of final shipment, executed original bills of lading and/or manifests with attached certified scale weight tickets.

I. Submit to the Authority records of decontamination water sampling, discharge and disposal.

J. Submit to the Authority for approval prior to transport the name and location of the disposal site(s) for all uncontaminated natural soil removed from the site.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide all employees of the Contractor and the subcontractor(s) with personal protective equipment and protective clothing consistent with the levels of protection required for this Work as indicated in the site specific Health and Safety Plan.

2.02 STORAGE LABELS

A. Provide signage to label all stockpiles. Labels shall be of 6-inch by 12-inch weatherproof material, such as plastic, affixed to 1" x 3" wood straps, 3 feet long. The labels shall be clearly marked with indelible ink marker. Markings shall be as agreed upon between Authority and Contractor.

2.03 STOCKPILE SHEETING

A. Either HDPE or NRPE is suitable for stockpile sheeting.

B. High Density Polyethylene (HDPE) Membrane

1. The membrane liner shall be manufactured of new, first quality products designed and manufactured specifically for the proposed use.

2. The liner material shall be produced free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. Such defects shall be repaired using the extrusion fusion welding technique in accordance with the manufacturer's recommendations.

3. The liner material shall be manufactured in a minimum 10 foot seamless width. Labels on the roll shall identify the thickness, length, width and manufacturer's mark number.

4. The liner material shall be ultra-violet resistant and cold crack resistant to -40 degrees Fahrenheit.

C. Nylon Reinforced Polyethylene (NRPE) Membrane

1. The membrane shall be manufactured of new, first quality product designed and manufactured specifically for the intended use.

2. The material shall be 10-mil polyethylene reinforced with a non-woven grid of high strength nylon cord.

3. The material shall be ultra-violet resistant and cold crack resistant to -40 degrees Fahrenheit.

4. The materials shall be manufactured in a minimum 12 foot seamless width. Labels on the roll shall identify the thickness, length width and manufacturer's mark number.

2.04 STOCKPILE PADS AND/OR CONTAINERS

A. Excavated TCLP-Metals soil shall be stored in either containers, tanks or containment buildings designed and operated in accordance with 40 CFR Subparts I, J and DD, respectively.

2.05 EQUIPMENT AND VEHICLE DECONTAMINATION PAD

A. At the direction of the Authority, a decontamination pad shall be constructed of reinforced concrete or bituminous concrete to withstand an H-20 loading. The decontamination pad shall be of minimum length to accommodate one 18-wheel dump truck, and a minimum area to accommodate the largest piece of equipment to be used in the excavation. The pad shall have a six inch containment berm and provisions for collection, storage and disposal of decontamination water.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall perform all Work in this Section in accordance with the site-specific Hazardous Materials Health and Safety Plan. Site controls established in the Hazardous Materials Health and Safety Plan shall be in operation prior to the commencement of Work.

B. Immediately notify the Authority of visible stains or unnatural odor of any excavated material, or if potentially contaminated and/or hazardous material is encountered.

C. Unless material has been previously classified by the Consultant, the Contractor shall collect and analyze soil samples prior to excavation activities for disposal classification.

D. Based upon the findings of precharacterization activities, a release of oil and/or hazardous materials at the Site was reported to the Massachusetts DEP in October 2003. Therefore, the removal of contaminated media (soil or groundwater) from the Site must be conducted in accordance with the MCP. No impacted media shall be removed from the Site until a plan has been submitted and, if applicable, approved by the DEP.

E. Provide dust control measures.

3.02 FIELD SCREENING EXCAVATED MATERIAL

A. Screen soil and other materials for the presence of oil and hazardous material as excavation proceeds using visual, olfactory and field screening evaluation.

B. Perform field screening evaluation in accordance with Department of Environmental Protection Policy No. WSC-94-900, "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils, Attachment II, Jar Headspace Analytical Screening Procedure."

C. Provide services of one or more individuals to field screen excavated materials. The individual(s) shall have been adequately trained in the use of the PID. Jar headspace results shall be recorded on the Contractors daily excavation log.

D. Field screening equipment shall be provided by the Contractor and maintained and calibrated according to the manufacturer's recommendations.

E. Maintenance and calibration data shall be recorded on the Contractor's daily excavation log and submitted to the Consultant.

F. The Contractor shall perform field screening of excavated material at a frequency no less than every 50 cubic yards of material or fraction thereof.

G. In the event that reportable conditions are encountered which require notification to the Department of Environmental Protection (DEP), the requirements of the MCP will apply. Depending upon the nature of the reportable conditions, the MCP may require the cessation of Work, implementing an "Immediate Response Action Plan", or developing a "Release Abatement Measures Plan" prior to continuing work, or other actions which could delay certain aspects of site Work. The Contractor shall ensure that his field supervisory personnel are familiar with the MCP definitions of "two hour", "72 hour" and "120 day" reportable conditions. The Authority shall be notified immediately of two hour and 72 hour reporting conditions. Notification to the DEP will be the responsibility of the Authority, unless otherwise directed by the Authority.

3.03 STOCKPILING EXCAVATED MATERIAL

A. All excavated material shall be stored in a secure manner to prevent exposure to humans and the environment.

B. The stockpiling or consolidating of excavated material near sensitive human health receptors such as public and private water supply wells or sensitive environmental receptors such as wetlands, surface water bodies, or marine environments shall be prohibited.

C. All excavated material stored at the site of generation or at a temporary storage location shall be placed entirely on a polyethylene liner, and shall be covered at the end of each day's work with the same material or so as to minimize the infiltration of precipitation, volatilization of contaminants and erosion of the stockpile. Any cover material used shall be properly secured and possess the necessary physical strength to resist tearing by the wind and other elements.

D. The stockpiles shall be bermed around the edges to minimize infiltration of stormwater or exfiltration of leachate.

E. Any failure of materials or procedures used in employing the base layer or cover layer shall be immediately repaired, replaced or re-secured so as to minimize precipitation infiltration, volatilization and erosion/runoff of the excavated soil.

F. Movement and/or aeration of excavated soil shall be limited to those activities that are necessary to manage such stockpiles. Land farming of soil stockpiles is prohibited unless appropriate steps have been taken to minimize and treat potential air emissions.

G. Stockpile excavated soils or materials not previously classified in accordance with the field screening classification, final characterization, or as otherwise directed by the Authority. Maintain

separate stockpiles for each classification. Transfer suspected contaminated soils from the excavation to a stockpile area in a manner to prevent the spread of contaminated soils with other soils.

H. Disposal of soil that is contaminated as a result of careless handling or use of unauthorized procedures shall be at the Contractors expense. Delays of Work resulting from temporary storage of excavated material, regardless of the classification, shall be at no additional cost to the Authority.

I. Stockpiles of material in which any chemical constituent is reported in excess of the applicable MCP Reportable Concentration shall be transported to an approved disposal facility within 120 days of excavation.

J. Should the Contractor stockpile material previously classified by the Subconsultant through in-situ sampling, the Contractor shall segregate the material into stockpiles corresponding with the Subconsultant's classification. The Contractor shall not combine or mix material of different classifications.

K. The Contractor shall segregate excavated material into stockpiles no greater than 500 cubic yards. The Contractor shall collect the necessary samples of the stockpile at that time for final classification.

L. The stockpiles shall be clearly labeled and securely barricaded from contact with workers and the general public.

3.04 CLASSIFICATION OF SOIL

A. The Contractor will classify stockpiled material for purposes of reuse, recycling and/or disposal based on the laboratory analyses of soil samples collected and analyzed by the Contractor. The classifications are:

1. In-State Unlined Landfill
2. In-State Lined Landfill
3. In-State Recycling Facility
4. Out-of-State Recycling Facility
5. Non-RCRA Out-of-State Lined Landfill
6. RCRA Landfill

B. The classification of final disposal of excavated material will be based on the comparison of the contaminant concentrations detected in the stockpiled material to those concentrations set forth in the operating permits for the respective facilities.

3.05 TRACKING OF EXCAVATED MATERIAL

A. The Contractor shall provide a soil tracking system to track soils between excavation, stockpiling, sampling and testing, and final disposition.

1. Include in the soil tracking system the identification of the source of material (station, offset, depth, date of excavation, etc.) stockpile identification and location.
2. Submit to the Authority for review, the soil tracking plan, include all proposed daily log sheets.
3. Provide to the Authority, on a daily basis, copies of field records documenting the location

of stockpiled material in the system and stockpile identification data.

4. Each stockpile shall be identified with a suitable weatherproof sign attached to a stake driven into the pile.
5. Employ a master plan of the soil stockpile area(s), and mark and maintain the plan to show the location of all soil stockpiled on a daily basis. Furnish a duplicate copy of the master stockpile plan to be located in the Consultant's field office, and update the plan on a daily basis.

3.06 DISPOSAL DOCUMENTATION

A. Submit written confirmation to the Authority from each proposed disposal facility indicating that they will accept material from this Contract.

B. The Authority will be designated as the Generator and will sign all waste profiles, bills of lading and manifests.

C. The Contractor shall provide certified tare and gross weight slips for each load received at the designated disposal facility. The weight slips shall accompany the respective manifest or bill of lading when submitted to the Authority.

D. The Contractor shall submit the original copies of the executed manifests and bills of lading with the appropriate weight slips within 10 business days from the last date of transport. The Contactor's LSP will be responsible for the submission of these documents to the appropriate State agencies.

3.07 TRANSPORTATION OF EXCAVATED MATERIAL

A. As noted in Section 3.01, no contaminated media shall be removed from the Site until the applicable documentation has been submitted to the DEP.

B. The Contractor shall select disposal/recycling facilities that are established, fully operational, and in full compliance with all applicable local, state and federal regulations.

C. All excavated material transported upon public roadways shall be covered to minimize fugitive dust, and where necessary truck tire and undercarriage decontamination shall be employed to minimize tracking of soils onto public roadways.

D. Do not remove or arrange for the removal of excavated material from the site without prior written authorization from the Authority. No stockpiled material shall be removed for reuse, recycle, or disposal from the stockpile areas until the results of chemical analyses have been received and the materials have been classified by the Contractor and the appropriate shipping document (manifest, Bill of Lading, Material Shipping Record) has been signed by the Authority's representative and, in the case of Bills of Lading, by the Contractor's LSP.

E. Dewater soils prior to transport off site to prevent free water from developing during transport to the recycling, reuse, or disposal facility. Trucks transporting material to a RCRA Landfill shall be lined to prevent leakage and covered to prevent infiltration.

F. Load all material to be transported off-site into properly licensed and permitted vehicles, and transport all excavated material for off-site recycling, reuse, or disposal directly to the receiving facility approved by the Authority.

G. The Contractor shall transport material from the site to the landfills in accordance with all United States Department of Transportation (DOT), EPA, DEP and other applicable regulations.

3.08 DISPOSAL OF EXCAVATED MATERIAL

A. Dispose of materials described herein at In-State Unlined Landfills, In-State Lined Landfills, In-State Recycling Facilities, Out-of-State Recycling Facilities, Non-RCRA Out-of-State Lined Landfill, and RCRA landfills, in accordance with all Federal, State and local regulations.

B. The Contractor shall select the most economical disposal option for the Authority.

3.09 EQUIPMENT AND VEHICLE DECONTAMINATION

A. The Contractor shall design and construct a decontamination pad to be used to decontaminate equipment and vehicles exiting from the construction site.

B. The Contractor shall be responsible for the maintenance and operation of the decontamination station.

C. The Contractor shall provide a collection system for the decontamination pad wash water. The Contractor shall collect all wash water resulting from the decontamination process.

D. At the completion of the project, at no additional cost to the Authority, the Contractor shall dismantle and properly dispose of the decontamination pad and resulting contaminants.

E. The Contractor shall provide and use a high pressure water and steam system. Power required to generate steam and high pressure water greater than 90 pounds per square inch shall be the responsibility of the Contractor.

F. The use of drums and/or fractionation tanks for the storage of decontamination water is acceptable.

G. Decontamination water collection and storage units shall be secured and shall not leak.

H. Disposal of decontamination water in accordance with applicable regulations is the responsibility of the Contractor.

I. The decontamination pad shall be removed and disposed of following the completion of the Work. The pad shall either be disposed of with other contaminated or hazardous material or disposed of as construction debris if the Contractor can substantiate, through analytical testing, that the debris is not contaminated.

J. Disposal of the decontamination pad debris shall only be allowed following the Authority 's review of a confirmatory sampling plan. The Contractor shall submit a decontamination pad disposal plan that would include, but not be limited to, proposed sampling and analytical methods.

PART 4- MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. SCREENING AND STOCKPILING OF MATERIAL shall be measured by the cubic yard for material stockpiled and screened as specified in this Section for the duration of excavation. Measurement will be made based on the dimensions and depths of excavations.

B. Disposal of Solid Waste not otherwise classified by the provisions of this specification shall be measured by the ton and shall be paid for under DISPOSE OF FILL. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

C. Measurement for REMOVAL AND DISPOSAL OF excavated materials suitable for disposal at an in-state unlined landfill shall be by the ton as accepted by the reuse facility under DISPOSE OF CONTAMINATED SOIL. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

D. Measurement for REMOVAL AND DISPOSAL OF excavated materials suitable for disposal at an IN-STATE LANDFILLS shall be by the ton as accepted by the reuse facility. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

E. Measurement for REMOVAL AND DISPOSAL OF excavated materials suitable for disposal at IN-STATE RECYCLING FACILITIES shall be by the ton as accepted by the reuse facility. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

F. Measurement for REMOVAL AND DISPOSAL OF excavated materials suitable for disposal at OUT-OF-STATE RECYCLING FACILITIES shall be by the ton as accepted by the reuse facility. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

G. Measurement for REMOVAL AND DISPOSAL OF excavated materials suitable for disposal at NON-RCRA OUT-OF-STATE LINED LANDFILLS shall be by the ton as accepted by the reuse facility. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

H. Measurement for REMOVAL AND DISPOSAL OF materials suitable for disposal RCRA LANDFILLS shall be by the ton as accepted by the reuse facility. Payment will be made upon Authority's confirmation of the accepting facility's weight receipts and executed transportation and disposal documentation.

I. The SOIL MANAGEMENT AND DISPOSAL PLAN shall be paid as a lump sum when the plan is approved by the Authority. The Plan shall be paid under the payment item "Hazardous Materials Abatement Work Plan."

J. DECONTAMINATION shall be a lump sum for construction, operation, dismantling, and disposal of each decontamination station, as specified herein. Decontamination is contingent upon Engineers opinion of site conditions.

K. REMOVAL AND DISPOSAL OF DECONTAMINATION WATER shall be paid per gallon treated or transported and disposed of off site, according to approved submittals.

L. LICENSED SITE PROFESSIONAL SERVICES shall be a paid as an allowance based upon the approved Contract.

4.02 PAYMENT

A. Soil Management and Disposal will be paid for at the Contract Unit Prices for the quantities determined as specified above. Payment for disposal will be at the unit rate associated with the facility permitted to accept the material for the least cost.

4.03 PAYMENT ITEMS

ITEM NO.	DESCRIPTION	UNIT
0222.458	DISPOSE OF CONTAMINATED SOIL	TON
0221.342	DISPOSE OF FILL	TON
0221.345	DISPOSE OF CONTAMINATED SOIL AT IN-STATE LINED LANDFILL	TON
0221.346	DISPOSE OF HAZARDOUS SOIL OUT-OF-STATE RECYCLING FACILITY	TON
0221.347	DISPOSE OF CONTAMINATED SOIL IN-STATE RECYCLING FACILITY	TON
0221.349	CONTAMINATED SOIL DISPOSAL AT NON-RCRA OUT-OF-STATE LANDFILL	TON
0222.018	SCREEN AND STOCKPILE MATERIAL	CY
0222.364	HAZARDOUS MATERIALS ABATEMENT WORK PLAN	LS
0222.365	DISPOSE OF RCRA HAZARDOUS WASTE	TON
0222.369	REMOVE AND DISPOSE OF DECONTAMINATION WATER	GAL.
0222.456	DECONTAMINATION	LS
0160.091	LICENSED SITE PROFESSIONAL SERVICES	AL

END OF SECTION

SECTION 02082

REMOVAL, TRANSPORTATION AND DISPOSAL OF OIL AND HAZARDOUS MATERIAL

PART I-GENERAL

1.01 DESCRIPTION

A. This Section specifies all labor, materials, tools and equipment necessary for the transportation and disposal of oil and hazardous materials included in this section.

B. The Contractor shall be responsible for the characterization, handling, stockpiling, transportation and disposal/reuse/recycling of oil or hazardous materials (OHM), including, but not limited to, debris and containerized materials specified under this contract.

C. All provisions of this Section relating to the health and safety of workers and the general public, as well as protection of the environment are minimum standards. The Contractor is responsible for determining whether any legal requirements or prudent conservative work practices require any additional and/or more stringent protective measures, and implementing such measures if deemed necessary. Nothing in this Section shall be deemed to relieve the Contractor from any liability with respect to any such legal requirements or requirement of prudent conservative practice.

D. All work-site preparations and practices will be conducted in accordance with all Federal, State and appropriate City and other local regulations, standards and codes pertaining to worker health protection, protection of the public health and the environment, and the removal, sampling, transportation, and disposal of oil and/or hazardous materials, including current U.S. Environmental Protection Agency (EPA), Department of Labor Occupational Safety and Health Administration (OSHA), US Department of Transportation (DOT), Massachusetts Department of Labor and Work Force Development (MA DLWD), Massachusetts Department of Environmental Protection (MA DEP), local and all other Federal, Commonwealth of Massachusetts and local regulations pertaining to removal, transportation and disposal.

E. All personnel involved in the removal of potentially hazardous materials shall have attended 40-hour training in accordance with applicable OSHA requirements for hazardous material handling.

F. This Section does not cover the removal or disposal of asbestos or lead based paint. The removal and disposal of these materials shall be conducted in accordance with Sections 02080 and 02090, respectively.

G. This Section does not cover the removal or disposal of soil. The removal and disposal of soil shall be conducted in accordance with Section 02081.

H. The Contractor is responsible, subject to review by the Authority and the Subconsultant to completely characterize the OHM in accordance with disposal facility requirements and all applicable laws and regulations and to dispose of the materials in a safe and legal manner.

I. The Contractor shall retain a laboratory to assist the Contractor in providing guidance in dealing with all OHM materials encountered at the Site. The Contractor's selected laboratory shall be

certified, as applicable, by the Commonwealth of Massachusetts to perform the analyses required to properly dispose of waste material encountered.

J. The Contractor is encouraged to recycle/reuse materials where appropriate in lieu of disposal if the material is of acceptable physical quality and chemical quality, and the Contractor can identify a facility willing and permitted to accept the material.

1.02 DESCRIPTION

A. Work covered by this Section consists of furnishing all labor, equipment, materials, and services to remove and dispose of potentially hazardous materials encountered during the renovation of Maverick Station.

B. A preliminary inspection of the Site revealed the presence of potential PCB-containing light ballasts, mercury/lead-containing fluorescent lights, high-intensity discharge (HID) lamp bulbs, railroad ties, ballast material, and miscellaneous paints and unlabeled containers. The Contractor may encounter these potentially hazardous materials when performing Work covered by this Section:

1.03 DEFINITIONS

A. Oil or Hazardous Materials (OHM)

1. Material defined as OHM in accordance with 310 CMR 40.0000 and 310 CMR 30.00.

B. RCRA/State Regulated Hazardous Waste

1. OHM defined as a RCRA characteristic or listed hazardous waste in accordance with 40 CFR 261 and/or
2. OHM defined as a hazardous waste in accordance with 310 CMR 30.00 and/or 310 CMR 30.100 et seq.

C. TSCA Regulated Waste

1. OHM which exceeds the TSCA criteria for PCBs as defined in 40 CFR 761. D.

D. RCRA/TSCA Regulated Waste

1. OHM which meets the requirements as both a RCRA hazardous waste and a TSCA regulated waste as defined above.

E. In-State Lined Landfill - This type of facility shall be approved by the Commonwealth of Massachusetts to accept soil that is not considered a hazardous waste, as defined in 310 CMR 30.00 and 310 CMR 40.0000, is not classified as a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261 and is not classified as a TSCA regulated waste as defined in 40 CFR Part 761, and that exhibits contaminant concentrations which do not exceed de minimum levels listed in Department of Environmental Protection Policy #COMM-97-001 Reuse and Disposal of Contaminated Soil at Massachusetts Landfills.

F. Non-Hazardous Special Waste

1. This material is specifically defined as the coal and coal ash.

M. Material - Soil, pavement, cobblestones, sorptive pads, ballast, railroad ties, rocks, concrete, pipes, coal, coal ash, oils and miscellaneous structures and debris.

1.04 QUALITY ASSURANCE

A. Environmental Consultant

1. The Contractor shall retain a Licensed Site Professional, as defined in the Massachusetts Contingency Plan (310 CMR 40.0000) to provide guidance during the work of this Section. The Licensed Site Professional must meet the requirements specified in Section 01400 - Quality Control.

B. General: The Contractor shall conform to all applicable requirements, ordinances, codes, regulations, policies and/or laws of, including but not limited to:

1. The Department of Environmental Protection (DEP) of the Commonwealth of Massachusetts.
2. The General Laws of the Commonwealth of Massachusetts (MGL).
3. The U.S. Environmental Protection Agency (USEPA).
4. The Occupational Safety and Health Administration (OSHA) with special emphasis to 1926.65/1910.120 Hazardous Waste Operations and Emergency Response.
5. The local Fire Department regulations.
6. The U.S. Department of Transportation (DOT).

C. Manifests/Bills of Lading

1. A uniform hazardous waste manifest, bill of lading, or other applicable documentation is required for the removal from the premises, and disposal of all items included in this Section. The Contractor shall obtain and prepare all such documents. The Contractor shall provide the Authority and the Subconsultant with a copy of the manifest(s), bills of lading, and any other shipping documents at least 5 business days prior to transport of the material from the site. The disposal manifests, bills of lading and any other shipping documents will be reviewed, authorized and signed by the Authority.

2. The Contractor shall be responsible for obtaining a Licensed Site Professional to render opinions under MGL Chapter 21 E. The Contractor's Licensed Site Professional shall prepare, stamp, sign and process all bills of lading.

3. Each manifest, bill of lading as well as all other documentation required herein, shall be clearly and distinctly marked with the contract number and removal and disposal order number as applicable. If blocks are not provided, the contract and removal and disposal order information shall be placed in the upper right hand corner of each document.

4. Each manifest, bill of lading, or other applicable documentation, shall note the truck registration number, state of registration, name of driver, and date of removal of material from the site.

5. The cost of preparation and processing of the manifests, bills of lading, and other applicable documents shall be included in the bid unit prices.

D. Inspection:

1. All services shall be subject to inspection by the Authority or its authorized representatives. The Authority will have the right, but not the duty, to inspect and obtain copies of all written licenses, training records, permits, and approval issued by any entity or agency to the Contractor or its subcontractors which are applicable to the performance of services under this contract; to inspect and test, at its own expense, transportation vehicles or vessels, containers, and disposal facilities provided by the Contractor; and to inspect the handling, loading, transportation, storage and disposal operations conducted by the Contractor in the performance of this contract.

2. The Engineer will have the right to inspect and obtain duplicates of all samples collected by the Contractor. If requested by the Authority or the Engineer, the Contractor shall collect and supply these samples to the Engineer for analyses by the Engineer's laboratory.

3. The Authority and its representative will be afforded free access to any facility used by the Contractor in performing services under this contract, including, but not limited to, offices and facilities where contract related records are retained.

4. The Contractor is solely and exclusively responsible for the quality of all services performed under this contract. The Authority's right to conduct inspections at Contractor's facilities does not relieve the Contractor of this responsibility. Neither the Authority, nor their authorized representatives' failure to make such inspection, nor failure to discover nonconforming services, will impose any liability on the Authority or their authorized representatives, nor shall it prejudice the rights of the Authority thereafter to reject services, and shall not relieve the Contractor of its obligation to perform work strictly in accordance with the contract and applicable local, state and federal regulations.

5. The Contractor in its agreement with subcontractors, shall ensure that the inspection rights described herein are afforded to the Authority by each subcontractor performing services under this contract.

6. If any of the services do not conform with contract requirements, the Authority will require the Contractor to perform the services again at no additional cost to the Authority. When the defects in services cannot be corrected by re-performance, the Authority may (1) require the Contractor to take necessary action to ensure that future performance conforms to contract requirements and (2) reduce the contract price to reflect the reduced value of the services performed.

1.05 SUBMITTALS

The Contractor shall provide the following submittals:

A. The Contractor shall submit the name, address, and qualifications of the Environmental Laboratory which they intend to use for this project. The laboratory shall be certified, as applicable, by the Commonwealth of Massachusetts to perform the required analyses. A copy of any certifications shall be included in the submission.

B. The Contractor shall be responsible for obtaining any necessary licenses and permits and for complying with any applicable federal, state and local laws, codes, policies and regulations in connection with the performance of this work. The Contractor shall provide a copy of all such permits and licenses to the Engineer at least 5 business days prior to the start of work on this contract. Applicable permits pertaining to disposal facilities to be utilized shall also be provided at this time.

C. The Contractor shall submit to the Engineer all analytical results including chain of custody records within 5 business days of receipt and at a minimum 5 business days prior to off-site transportation and disposal of the items included in this Section. In addition, the Contractor shall submit to the Engineer summary tables of all analytical results and identify how the material shall be classified for disposal.

D. The Contractor shall submit to the Authority, for review and approval, completed copies of all waste profiles, applications and questionnaires, prior to forwarding them to the party requiring these documents.

F. Submit to the Engineer for approval, a Work Plan including all pertinent information relating to the removal and transportation of hazardous materials from the Site within 14 business days after issuance of the Notice to Proceed. The Work Plan, at a minimum, shall include:

1. The name(s), address(es), and contact(s) of Subcontractors retained for Work of this section.

2. A detailed description of Work activities and progress schedule for each phase of the Work associated with the removal, transportation, and disposal of hazardous materials.

3. A statement of compliance, and evidence of said compliance, with applicable Federal, State, Regional, and Local regulations covering such work.

4. Name(s), address(es), and contact(s) of hazardous waste transporter(s) that transport hazardous waste from the Site to a TSD facility, including EPA identification number and proof of permit, license, or authorization to transport hazardous waste in all affected states.

5. Name(s), address(es), and contact(s) of TSD facility(s) that will accept hazardous waste from the Site, including nature of store/dispose of hazardous waste, and a letter of acceptance indicating that the facility(s) will accept hazardous waste from the Site.

6. List(s) matching each TSD facility with the hazardous waste it will accept from the site, including, but not limited to, those items identified in Paragraph 1.02B.

G. The Contractor shall complete any manifests, bills of lading or other documents required to transport and dispose of the items identified in this Section. The Contractor shall submit the completed forms to the Engineer for review. The Contractor shall not transport or dispose of any materials until authorized by the Authority. Completed copies of all manifests, bills of lading and other applicable documents and certified scale weight receipts or certified liquid quantity measurements, as applicable, must be furnished to the Authority as attachments to all invoices. The Contractor shall also be responsible for processing and distributing, as necessary, the completed manifests, bills of lading or other applicable documentation, as required by local, state and federal regulations.

H. The Contractor shall prepare and submit, to the Authority, a report that summarizes and documents the removal and disposal of all hazardous materials which left the Site. The report shall be a prerequisite for payment. At a minimum the report shall include the names of the disposal facility, a summary of materials disposed of at each facility, and a copy of the manifest, bill of lading and other applicable documentation, for each load.

1.06 REGULATORY REQUIREMENTS

A. The Work of this Section shall be performed in accordance with all applicable Federal, State, and Local regulations, laws, codes, and ordinances governing the removal, handling, transportation, and disposal of materials managed under this contract.

B. The Contractor shall obtain all Federal, State and Local permits required for the removal, handling, transport and disposal of materials managed under this contract. The Contractor shall adhere to all permit requirements.

1. The Contractor shall document that the disposal facilities proposed have all certifications and permits as required by Federal, State and Local regulatory agencies to receive and dispose of the material managed under this contract.

C. The following regulations are cited for the information and guidance of the Contractor. The list below is not all-inclusive; the Contractor shall be responsible for a thorough knowledge and full implementation of all requirements for removal, transportation, and disposal of hazardous materials.

1. Massachusetts Hazardous Waste Regulations, 310 CMR 30.00.
2. Massachusetts Contingency Plan (MCP) 310 CMR 40.0000.
3. Massachusetts DEP Policy #COMM-97-001.
4. Solid Waste Management Facility Regulations, 310 CMR 19.00.
5. Site Assignment Regulation for Solid Waste Facilities, 310 CMR 16.000.
6. Origin and/or Hazardous Constituents, DEP Policy No. HW-93-01.
7. "Hazardous Waste Operations and Emergency Response", Federal Occupational Safety and Health Act (OSHA), 29 CFR 1910.120.
8. "General Regulations for Hazardous Waste Management", EPA, 40 CFR 260.
9. "Regulations for Identifying Hazardous Waste, Hazardous Waste Generators and Hazardous Waste Transporters", EPA, 40 CFR 261, 262 and 263.
10. Regulations for Owners and Operators of Permitted Hazardous Waste Facilities", EPA, 40 CFR 264.
11. "Interim Status Standards for Owners and Operators of Permitted Hazardous Waste Facilities", EPA. 40 CFR 265.
12. "Standards for Management of Specific Hazardous Wastes and Facilities", EPA, 40 CFR 266.
13. "Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities", EPA, 40 CFR 267.

PART 2 – PRODUCTS

2.01 GENERAL

A. The Contractor shall provide all personnel with personal protective equipment (PPE), protective clothing, and monitoring equipment consistent with the levels of protection required for each type of work. The Contractor is responsible for determining the required level of PPE for any work associated with this contract.

B. The Contractor shall provide granular absorbent such as Speedy-Dry or approved equal, and any other emergency spill response equipment as may be necessary to complete the work outlined in this specification.

C. The Contractor shall provide all drums, overpack drums, storage containers, recovery cylinders, packing materials, and related products and materials required for collecting, storing, and transporting oil and/or hazardous materials in compliance with Massachusetts Department of Environmental Protection (DEP), U.S. EPA, and U.S. Department of Transportation (DOT) requirements. All drums shall meet the requirements of DOT 49 CFR 173.

D. The Contractor shall provide all monitoring equipment, equipment, and containers necessary to collect, sample, drain, evacuate, flush, handle, secure, remove, transport, and dispose of all hazardous materials and refrigerant gases at the Site.

E. The Contractor shall provide all materials, products, and equipment necessary to bulk, shred, sort, flush, dilute, or otherwise prepare hazardous materials for disposal at approved facilities.

F. The Contractor shall provide all materials for temporary containment areas including: berms; containment pads; impervious barriers; and absorbent materials.

PART 3 – EXECUTION

3.01 GENERAL

A. The Authority will be the generator and will sign all manifests, bills of lading, and other applicable documentation as required. The Contractor shall prepare a summary of analytical data as part of the document package. The applicable documents will be prepared by the Contractor and may be subject to applicable local, state and federal agency review and approval. The Subconsultant shall review all manifests, bills of lading, and other applicable documentation on behalf of the Authority.

B. Utilization of a hazardous material manifest shall require the use of a licensed hazardous material transporter in conformance with the Massachusetts Hazardous Material Regulations as required by 310 CMR 30.000. A Licensed Site Professional Opinion (310 CMR 40.0000) is not required when using a hazardous material manifest when transporting contaminated materials.

C. All Work shall be performed in a manner as to prevent any spills and leaks.

D. In the event that Work is being conducted in the vicinity of floor drains or openings in the floor, berms or other barriers shall be constructed to prevent the release of hazardous materials to the sanitary sewer system or subsurface at the Site.

E. The Contractor shall be fully aware of all such requirements; ensure that all required permits are obtained and in place including those required of any Sub-contractor, prepare all manifests and certifications, and deliver all copies of completed manifests and final certifications and certification of destruction to the Engineer in the form of one complete trucking document.

3.02 CHARACTERIZATION OF WASTES

A. The Contractor shall be responsible for all waste characterization, sampling and analysis.

B. The Contractor is responsible to ensure that materials are characterized to meet disposal facility requirements.

C. The Contractor shall be required to submit a copy of all analytical results to the Engineer within 5 business days of receipt and at least 5 business days prior to transportation off-site.

D. If requested by the Authority or the Engineer, the Contractor shall, at the time of sample collection, provide duplicate samples for analysis by the Engineer's laboratory.

E. In the event that there are discrepancies between the Contractor's and Engineer's lab, the Contractor shall have their lab check and verify their results and provide all laboratory analytical backup.

F. If the Contractor and the Engineer can not agree on the results, the Contractor shall collect and resubmit samples to his lab for analyses at no additional cost to the Authority.

G. Sampling of material shall be done by the Contractor at sufficient and adequately distributed locations so that the concentrations of the chemical constituents are adequately characterized.

3.03 BALLAST REMOVAL

A. All light fixture ballasts and capacitors shall be removed using appropriate techniques and personal protection gear as detailed in the submittals.

B. Prior to removal of any ballasts, the Contractor shall uncover and inspect the label on the ballasts. All ballasts designated as "No PCBs" shall be marked with green paint, all other ballasts and capacitors shall be assumed to contain PCBs and shall be marked with red paint. Similar color-coding shall be used for the receiving drums.

C. Removal shall be performed using approved methods and tools that will minimize damage to the fluorescent lamp and ensure a quick, neat removal with the ballast or capacitor intact and undamaged.

D. Once removed, the ballasts and capacitors shall be placed in color coded 55-gallon drums.

E. Once filled, the 55-gallon drums shall be closed and properly labeled for transport and disposal.

3.04 HIGH INTENSITY DISCHARGE (HID) BULB REMOVAL

A. All light HID bulbs shall be removed using appropriate techniques and personal protection gear as detailed in the submittals.

B. Contractor shall remove all fluorescent light bulbs and/or high intensity discharge (HID) lamps, intact, prior to demolition activities, and to dispose of all light bulbs as mercury or lead waste in accordance with all applicable state and federal regulations.

C. Removal shall be performed using approved methods and tools that will minimize damage to the fluorescent lamp and leave the bulb intact and undamaged.

3.05 REFRIGERANT

A. Unless contents are clearly labeled, perform analytical testing to identify the refrigerant.

B. Discharge gases into appropriate DOT approved container vessels, and label for transport and disposal. Decontaminate all systems by means of steam cleaning or triple rinsing or both with a cleaning fluid to remove all residual contamination. Collect and drum all decontamination fluids into approved containers. Label containers for transport and disposal.

C. All activities associated with the removal and reclamation of refrigerant gases shall be in accordance with Section 608 of the Federal Clean Air Acts Amendment of 1991.

3.06 MACHINERY FLUIDS

A. Drain and collect liquids from all equipment containing lubricating oils, hydraulic oils, or other types of fluids. This equipment includes, but is not limited to air compressors, fans, and pumps.

B. Decontaminate all systems by means of steam cleaning or triple rinsing or both with a cleaning fluid to remove all residual contamination. Collect and drum all decontamination fluids into approved containers. Label containers for transport and disposal.

C. Label drum/container for transport and disposal.

3.07 ELECTRICAL EQUIPMENT

A. All Work performed under this sections shall be conducted in accordance with provisions of the Sections of Division 16 of these Specifications .

B. All light electrical equipment shall be removed using appropriate techniques and personal protection gear as detailed in the submittals.

C. Removal shall be performed using approved methods and tools that will minimize damage to the equipment and ensure a quick, neat removal with the equipment intact and undamaged.

D. Once removed, the equipment shall be placed in 55-gallon drums.

E. Once filled, the 55-gallon drums shall be closed and properly labeled for transport and disposal.

3.08 STORAGE OF MATERIALS

A. Once removed, materials shall be stored on-site for no more than 30 calendar days. At the conclusion of each work day, drums containing hazardous materials shall be stored in a designated secure location under lock and key until they are removed for transport and disposal.

B. Hazardous materials shall be stored and loaded from secure areas that are impervious and contained. At a minimum, the area shall be lined with 6-mil high-density polyethylene (HDPE) overlaid with absorbent paper.

3.09 WASTE PROFILES AND MANIFESTS/BILLS OF LADING

A. The EPA RCRA ID No. for the site is MAD985271832.

B. The Contractor shall be responsible for preparing and submitting to the Engineer for review all waste profile applications and questionnaires, and coordination with disposal facilities and all Federal and State Environmental Agencies as applicable. The Contractor shall provide the Engineer with completed copies of all waste profile applications and questionnaires prior to transportation off site. The Contractor shall not transport any material off site until the submitted paperwork is authorized by the Authority.

C. The Contractor shall be responsible for preparing all hazardous material manifests, bills of lading and any other applicable paperwork with all applicable analytical backup, notification, and control forms. The Contractor shall be responsible for coordination with the disposal facilities.

D. The Contractor shall also provide certified tare and gross weight slips or certified liquid volume measurements for each load received at the designated facility, which shall be attached to each completed manifest and/or bill of lading. The completed manifest and/or bill of lading, with supporting documentation, shall be submitted to the Engineer.

E. The Authority will be designated as generator and will sign all manifests and waste profile applications or questionnaires. The Contractor's Licensed Site Professional is responsible for stamping and signing all bills of lading.

F. The Contractor shall furnish all generator copies of the hazardous material manifest to the Authority. The Contractor shall submit copies to the applicable local, state and federal authorities.

G. The Contractor shall submit to the Authority and the Engineer, prior to receiving progress payment, documentation certifying that all materials were transported to, accepted, and disposed of, at the selected disposal facility. The Subconsultant shall review all manifests, bills of lading, and other applicable documentation on behalf of the Authority. The documentation shall include, at a minimum, the following:

1. Documentation shall be provided for each load from the site to the disposal facility, including all manifests and any other transfer documentation as applicable.

2. Certified tare and gross weight slips and/or certified liquid quantity measurements for each load, as applicable.

3.10 TRANSPORT OF CONTAMINATED MATERIAL

A. The Contractor shall not be permitted to transport contaminated materials off-site until all disposal or recycling facility documentation has been received, reviewed, and accepted by the Authority.

B. The Contractor shall transport contaminated materials from the site to the disposal or recycling facility in accordance with all DOT, USEPA, OSHA, MADEP regulations and any other applicable regulations.

C. The Hauler(s) shall be licensed in all states affected by transport.

D. The Contractor shall coordinate the schedule for truck arrivals and departures at the disposal site to meet the approved schedule.

E. The Contractor shall not deliver waste to any facility other than the disposal facility(ies) listed on the shipping manifest, bills of lading, and/or other applicable documentation.

F. The Contractor shall be responsible for inspecting the access routes for road conditions, overhead clearance, and weight restrictions, and shall provide traffic control when needed.

G. The Contractor shall provide to the Engineer copies of all weight slips (both tare and gross) and certified liquid quantity measurements, for every load disposed of at the accepted disposal facility. The Authority shall only make progress payments upon receipt of these slips.

H. The temporarily stockpiled items must be removed from the site by the Contractor in accordance with applicable regulatory deadlines and no later than the completion date of this contract.

I. The Contractor shall be responsible for any and all actions and costs necessary to remedy situations involving material spilled in transit or mud and dust tracked off-site. This cleanup and other ancillary activities shall be accomplished at the Contractor's expense.

J. When loaded, materials shall be kept several inches below the top of the truck or container. All trucks and containers shall be covered during transport as required by applicable law.

K. The Contractor shall clean the truck tires and bodies leaving the site by either hand or mechanical means. Should wash down water be utilized in the process, the Contractor is responsible to fully contain and characterize the water and for complying with all laws and regulations prior to discharge or disposal. In addition, the Contractor shall conduct street sweeping of all public ways and/or private ways as necessary, and as determined by the Authority, and shall collect and dispose of all materials and soil which may have migrated off site in the truck transfer process.

3.11 OFF-SITE DISPOSAL

A. The Contractor shall be responsible for the disposal of contaminated materials at licensed disposal/recycling facilities in accordance with all federal, state and local regulations, laws, codes, policies or requirements.

B. The Contractor shall identify within 14 days of receiving the Notice to Proceed and prior to the transportation of any items off-site, the storage, disposal, and recovery facility(ies) which they intend to use for this project.

C. The Contractor shall be responsible for acceptance of the specific material at an approved treatment, disposal, or recovery facility, for ensuring that the facility is properly permitted to accept the stated material, and that the facility provides the stated treatment and/or disposal services.

D. All hazardous wastes, as defined, shall be disposed of at a RCRA or RCRA/TSCA permitted facility as appropriate.

E. The Authority reserves the right to contact and visit the disposal facilities and regulatory agencies to verify their agreement to accept the stated material and to verify any other information provided. This does not in any way relieve the Contractor of any responsibilities under this contract.

F. In the event that the identified and approved facility(ies) ceases to accept the stated materials or the facility(ies) ceases operations, it is the Contractor's responsibility to locate any alternate approved and permitted facility(ies) for accepting materials. No additional compensation shall be provided to the Contractor for having to utilize alternative facilities. The Contractor is responsible for making the necessary arrangements to utilize alternative facility(ies), and the alternate facility(ies) must be approved by the Authority in the same manner and with the same requirements as for the original facility(ies).

G. All materials collected under this contract must be segregated and kept physically separate from any other items until the disposal facility is reached. The items must be so marked, so that they are readily identified to this contract throughout this period. In addition, the Contractor must ensure that there is a clear audit trail for all items until final treatment/disposal is accomplished.

H. The Contractor shall coordinate the disposal of work generated waste materials which may be contaminated. These waste materials include, but are not limited to, decontamination rinse water, disposable PPE, and miscellaneous disposable support equipment. Disposal of Contractor generated waste shall be done at no additional cost to the Authority.

I. Mere acceptance of a waste at a properly permitted treatment, storage, or disposal facility (TSDF) does not meet the definition of final treatment/disposal under this contract. It is the Contractor's responsibility to obtain all necessary documentation to prove that the final treatment/disposal of all items has been accomplished. This documentation shall be attached to the certificate of disposal and submitted with, or prior to, the payment requests.

J. Treatment of waste on the Authority's premises is not permitted. Treatment is defined as any process that meets the definition of treatment as set forth in applicable federal (including 40 CFR 260.10), state and local laws, codes, policies and regulations.

3.12 SPILL RESPONSIBILITY

A. The Contractor is solely responsible for any and all spills or leaks during the performance of work under this contract, which occur as a result of or are contributed to by the actions of its agents, employees or subcontractors. The Contractor agrees to clean up such spills or leaks to the

satisfaction of the Authority or its representative, and in a manner that complies with applicable federal, state and local laws, codes, policies and regulations. The spill cleanup shall be at no cost to the Authority or its representatives.

B. As required, the Contractor shall notify all applicable local, state and federal authorities immediately if the transport vehicle is involved in an accident and a reportable quantity of OHM is released or suspected to have been released.

C. The Contractor shall report all such spills or leaks, regardless of their quantity, to the Authority immediately upon discovery. A written follow-up report shall be submitted to the Authority as soon as possible, but not later than 24 hours after the initial telephone report. The written report shall be in narrative form and, at a minimum, include the following:

1. Description of item spilled (including identity, quantity, manifest number., etc.).
2. Exact time and location of spill, including a description of the area involved.
3. Containment procedures initiated.
4. Description of cleanup procedures employed or to be employed at the site, including location of disposal of spill residues, and corrective measures to prevent recurrences.

3.13 DECONTAMINATION PROCEDURES

A. General: The Contractor shall furnish labor, materials, tools, and equipment for decontamination of all personnel, equipment and supplies that enter the contaminated work area or are exposed to contaminated material. The Contractor shall provide equipment and decontamination pads, etc. necessary for the decontamination of equipment and personnel.

B. Methods: The decontamination procedure shall follow the requirements of 29 CFR 1926.65/1910.120 as described in the Contractor's Health and Safety Plan.

C. Personnel Decontamination: The Contractor shall provide and maintain a decontamination area which is to be located in the contamination reduction zone. The Contractor shall coordinate the location of the decontamination area with the Engineer. Decontamination of personnel and equipment is required after performance of activities in the exclusion zone. The personnel decontamination area may be in the form of a mobile trailer or field station. Personnel decontamination shall, at a minimum, consist of: decontamination before breaks and each time workers exit the exclusion zone, and at the completion of each work day to prevent worker exposure and the spread of contaminants off site.

1. Routine Decontamination: Routine decontamination shall follow the guidelines of 29 CFR 1926.65/1910.120.

2. Emergency Decontamination: Should a worker be splashed with contaminants, the worker shall be immediately escorted to the field decontamination station and decontaminated in accordance with Contractor's health and safety plan. Site eye wash and shower stations shall be made available and operable. .

D. Equipment:

1. All equipment shall be provided to the work site free of contamination. The Engineer retains express authority to prohibit from the site any equipment that in his/her opinion has not been

thoroughly decontaminated prior to arriving at the project location. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on the project site which is not thoroughly decontaminated upon arrival.

2. All equipment involved in Exclusion Zone activities shall be decontaminated and the effectiveness of the decontamination shall be determined each time it is removed from the Exclusion Zone. Equipment decontamination shall be performed in conformance with the requirements of 29 CFR 1926.65/1910.120 as described in the Contractor's Health and Safety Plan.

3. The Contractor shall decontaminate all equipment that comes in contact with contaminated material, either directly or indirectly, after completion of work at one location and prior to beginning work at another location, if so directed by the Authority or the Engineer.

E. Rinse water used for decontamination which contains chemicals used during decontamination or which contains hazardous chemicals from the equipment which was decontaminated shall be connected, characterized, handled and disposed of, by the Contractor, at no additional cost to the Authority.

F. Decon wastewater shall be classified as a "remedial wastewater".

G. Payment for the removal and disposal/discharge of decon wastewater shall be included under the Contractor's base bid and shall not be paid for separately under any unit price item.

H. The Contractor is responsible for any sampling and characterization as required by local, state, federal or facility requirements.

I. If appropriate, the Contractor shall coordinate discharges with the Massachusetts Water Resources Authority (MWRA) and Boston Water and Sewer Commission (BWSC).

J. The Contractor shall provide, maintain, and pay for any permits or monitoring necessary of the disposal/discharge of decon wastewaters.

K. If onsite treatment is proposed, the Contractor shall provide a licensed Treatment Plant Operator as required by local, state, federal, or facility requirements.

L. The Contractor shall be responsible for all costs, such as penalties and fines, related to materials transported and or disposed of in a manner not consistent with governing laws and regulations.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. The Removal, Transportation and Disposal of the materials listed below will be measured as a Unit Price (per ton, per gallon or per pound) as listed. Any preparation and/or incidental work necessary to complete the Transportation and Disposal of the items listed, will be considered incidental to the unit price.

1. Characterization, Transport and Disposal of Material as Solid RCRA/TSCA Regulated Waste will be measured by the ton, and payment will be made at the contract unit price for Item No. 0222.414 Dispose of Hazardous Waste.

2. Characterization, Transport and Disposal of Material as Solid RCRA/State Regulated Hazardous Waste will be measured by the ton, and payment will be made at the contract unit price for Item No. 0222.365 Dispose of RCRA Hazardous Waste under Section 02081, Part 4.01.

3. Characterization, Transport and Disposal of Material as Hazardous Waste will be measured by the ton, and payment will be made at the contract unit price for Item No. 0222.409 Remove and Dispose of Hazardous Waste.

4. Characterization, Transport and Disposal of Material as Solid Non-Hazardous Special Waste will be measured by the ton, and payment will be made at the contract unit price for Item No. 0222.411 Remove and Dispose of Special Waste.

5. Characterization, Transport and Disposal of Material as Liquid RCRA/State Regulated Hazardous Waste will be measured by the gallon, and payment will be made at the contract unit price for Item No. 0222.024 Non-Reclaimable Petroleum Product/Groundwater.

6. Characterization, Transport and Disposal of Material as Liquid RCRA/TSCA Regulated Waste will be measured by the gallon, and payment will be made at the contract unit price for Item No. 0225.150 Disposal of Non-Recyclable Oil.

7. Characterization, Transport and Dispose of Oil will be measured by the pound, and payment will be made at the contract unit price for Item No. 0222.151 Removal and Disposal of Oil Hazardous Chemicals and Materials.

8. The preparation of a Hazardous Materials Health and Safety Plan will be measured as a lump sum, and payment will be made under the provisions of Section 02083.

4.02 PAYMENT

A. Payment for the characterization, removal, transportation and disposal of the items listed will be made at the contract unit price as specified.

4.03 PAYMENT ITEM

Item No.	Description	Unit
0222.414	Dispose of Hazardous Waste	TN
0222.409	Remove and Dispose of Hazardous Waste	TN
0222.411	Remove and Dispose of Special Waste	TN
0222.024	Non-Reclaimable Petroleum Product/Groundwater	GL
0225.150	Disposal of Non-Recyclable Oil	GL
0225.151	Remove and Dispose of Oil Hazardous Chemicals and Materials	LB

END OF SECTION
02054

SECTION 02083

ABOVEGROUND STORAGE TANK REMOVAL

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Provisions of the contract, including General and Supplementary Conditions and applicable provisions of General Requirements, apply to the work specified within this Section.

B. All provisions of this Section relating to the health and safety of workers and the general public, as well as protection of the environment are minimum standards. The Contractor is responsible for determining whether any legal requirements or prudent conservative work practices require any additional and/or more stringent protective measures, and implementing such measures if deemed necessary. Nothing in this Section shall be deemed to relieve the Contractor from any liability with respect to any such legal requirements or requirement of prudent conservative practice.

C. All work-site preparations and practices will be conducted in accordance with all Federal, Massachusetts and appropriate City and other local regulations, standards and codes pertaining to worker health protection, protection of the public health and the environment, including current US Environmental Protection Agency (EPA), Department of Labor Occupational Safety and Health Administration (OSHA), US Department of Transportation (DOT), Massachusetts Department of Labor and Work Force Development (MA DLWD), Massachusetts Department of Environmental Protection (MA DEP), local and all other Federal, Commonwealth of Massachusetts and local regulations pertaining to removal, transportation and disposal.

D. All personnel involved in the removal of ASTs shall have attended 40-hour training in accordance with applicable OSHA requirements for hazardous material handling.

E. All personnel involved with work covered by this Section shall be made aware that asbestos-containing materials (ACM) and lead-based paint (LBP) are present throughout the facility. These materials are not to be disturbed or impacted during the activities outlined by this Section. Reference Section 02080 and Section 02090 for handling of ACM and LBP.

1.02 DESCRIPTION

A. Work covered by this Section consists of furnishing all labor, equipment, materials, and services to remove aboveground storage tanks (ASTs) during the renovation of Maverick Station.

B. The information contained herein is provided for the convenience of bidders and is not guaranteed to be accurate. Bidders and the selected Contractor must rely upon their own interpretation of information available and the results of their inspections of the facility in preparing their bids.

C. A minimum of one fuel oil AST is reportedly located within the existing Maverick Station.

D. The Contractor will be responsible for closure in accordance with applicable regulations. The scope will include, but not be limited to, emptying the tank(s) of free liquids and sludges; cleaning the tank(s), such that it remains free of explosive gases; dismantling, removal and disposal of the tank(s); remove, clean and

dispose of all pipes, systems and appurtenances associated with the tank(s); stockpiling, sampling, chemical analysis and disposal of the sand and gravel surrounding the tank(s), if applicable; remove, cleaning of the tank area of oil, soot, dirt and debris.

1.03 SUBMITTALS

A. The following items shall be submitted to the Engineer for review and approval in accordance with the schedule provided below:

Submittal	Date (relative to start/completion of work, or other milestones)
1. Written Health and Safety Plan, specific to this project.	4 weeks before start
2. Written Confined Space Entry Program, specific to this project.	4 weeks before start
3. Written Hazard Communication Program.	4 weeks before start
4. Statement that all employees entering confined spaces have been fit tested for respirators and have received the appropriate medical surveillance.	4 weeks before start
5. Name, address, telephone number and hazardous material transporter license of the company responsible for removing and transporting fuel oil from the tank.	4 weeks before start
6. Name, address, telephone number and operating permit for the facility designated for fuel, sludge and/or water disposal, including the analytical requirements, and the limitations on chemical compounds specified in the operating permit.	4 weeks before start
7. Name, address, telephone number and operating permit for the disposal facility identified for demolition debris such as pipes, fuel filters, fuel pumps and waste material such as cleaning residues.	4 weeks before start
8. Name, address, telephone number and State certification of the analytical laboratory identified for chemical analyses.	4 weeks before start
9. Names, address, telephone number and project responsibilities of any other subcontractors to be used by the Contractor in connection with tank work.	4 weeks before start
10. Spill Prevention, Control and Countermeasures Plan	4 weeks before start
11. Copies of all permits required to conduct this work.	4 weeks before start
12. Insurance certificates for the coverage specified in this specification for the General Contractor and each of his subcontractors.	4 weeks before start
13. Work Plan as described in this specification.	4 weeks before start
14. Confined space entry permit.	Prior to tank entry
15. Laboratory data required for disposal of any waste material.	3 working days prior to shipping of waste material
16. Shipping documents for any waste material transported.	4 weeks after completion of work
17. Disposal receipts for any material disposed.	4 weeks after completion of work

1.05 REFERENCE STANDARDS

A. Massachusetts Department of Environmental Protection regulations at 310 CMR 30.00, Hazardous Waste Regulations.

B. Commonwealth of Massachusetts, Fire Prevention Regulations 527 CMR 9.00, Tanks and Containers.

C. Occupational Safety and Health Administration (OSHA) Standard 29 CFR Parts 1910 and 1926, General Industry Safety and Health Standards Applicable to Construction Work and Technical Amendments, Final Rule.

D. Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910, Permit-Required Confined Spaces for General Industry

E. American Petroleum Institute (API), Safe Entry and Cleaning of Petroleum Storage Tanks, API Publication 2015.

F. Massachusetts Department of Environmental Protection regulations at 310 CMR 40.0000, Massachusetts Contingency Plan.

1.06 ENGINEER

A. The services of the Subconsultant will be provided by the Authority. The Subconsultant's responsibilities will include the following:

1. Review of the Contractor's submittals.
2. Oversight of the Contractor's Work.
3. Preparation and submission of a tank closure report as required by applicable regulations.
4. Determination that the Contractor has conducted the Work in accordance with this specification.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Contractor shall assure the workers perform their duties in a safe manner and are provided with required tools, personal protective equipment and training.

B. Tools and equipment used by Contractors shall be of the proper type and comply with applicable codes and laws.

C. The Contractor will specify appropriate precautions in the confined space entry program, and implement these precautions while working at the site.

2.02 EQUIPMENT

A. The Contractor shall furnish the applicable air monitoring, respirator protection and confined space entry equipment (if applicable). The Contractor shall conduct real-time air monitoring in order to measure the exposure of volatile organic compounds or other airborne toxins including but not limited to oxygen, lower and upper explosive limits, carbon monoxide and hydrogen sulfide. Employees will be required to don respiratory protection when cleaning the tank and when ambient air levels exceed the action level established in the site-specific Health and Safety Plan.

PART 3 – EXECUTION

3.01 INSPECTION

A. The Contractor is required to inspect the premises to confirm the existing conditions of the Work site. The Contractor shall also become familiar with present conditions, future requirements and assessment of site-specific requirements that will influence the performance of this Work. The Contractor is required to examine only what can be visibly examined at the present time.

3.02 PREPARATION

A. The Contractor shall make notification to and secure any and all permits from the appropriate regulatory authorities and local fire department in a proper and timely manner to perform the Work as required. The Contractor is responsible to pay all fees associated with the acquisition of the required permits or the filing of notifications. No Work shall commence until the Contractor has obtained these necessary permits and has those permits reviewed by the Subconsultant and posted on site.

B. Prior to the start of Work, the Contractor will seal and/or secure all floor drains and sumps in the Work area to prevent the migration of oil should a release occur. The drains and/or sumps will remain sealed or secured for the duration of the Work unless conditions arise that would require these drains to be operational. Should such a situation arise, the Contractor shall obtain approval from the Subconsultant prior to the removal of drain seals.

C. The Contractor shall provide, erect and maintain safety barricades, during all phases of the Work to prevent access of unauthorized personnel into the Work area. The Contractor is responsible for the security of the Work area for the duration of the Work.

D. Should the Contractor damage any equipment or fixtures in the process of the tank cleaning and closure activities, or for the duration of the Contractor being on site, the Contractor shall be required to repair or replace the damaged equipment or fixture to the satisfaction of the Consultant.

E. The General Contractor shall prepare and submit a Work Plan for completing the work described in this section. The plan shall include the following information:

1. Introduction
2. Contractors plan for completing work
    a. Schedule
    b. Methodology
        i. To empty tank and dispose of product
        ii. To dismantle pipes, pumps, filters, equipment
        iii. To gain access to and clean tank
        iv. To sample residual material prior to disposal
        v. To secure floor drains and sumps
3. Identification of permits required

3.03 PETROLEUM OIL STORAGE TANK CLOSURE REQUIREMENTS

A. The Contractor shall provide all labor, materials, equipment and services necessary to clean, remove and dispose of the tank. The associated piping and appurtenances, including associated equipment, shall be removed, cleaned and disposed.

B. The Contractor shall perform the Work in accordance with National Fire Protection Association (NFPA), code NFPA 30; Massachusetts Fire Prevention Regulations 527 CMR 9.00; Occupational Safety and Health Administration (OSHA) Standard 29 CFR Parts 1910 and 1926, General Industry Safety and Health Standards Applicable to Construction Work and Technical Amendments, Final Rules; and OSHA Standard 29 CFR parts 1910, Permit-Required Confined Spaces for General Industry; and other pertinent local, State and Federal regulations.

C. The Contractor shall photo-document Site conditions prior to, during and following tank decontamination, dismantling, removal and disposal procedures. Photographs taken shall include, but not be limited to, the following:

   i. Tank room prior to project initiation.
   ii. Tank room at completion of project.
   iii. Interior of tank upon completion of cleaning.
   iv. Exterior of tank.

D. The Contractor shall remove and dispose of all residual free flowing petroleum product and shall remove and dispose of all accumulated sludge and debris from the interior of the tank system. The residual product, sludge and wash waters generated during the cleaning of the tank shall be transported and disposed in accordance with Massachusetts Hazardous Waste Regulations 310 CMR 30.00, Federal Environmental Protection Agency's hazardous waste regulations and Department of Transportation regulations. Reusable product may be recycled with the approval of the Subconsultant.

E. The Contractor shall be responsible for the collection and any laboratory analysis necessary to dispose of tank contents, sludge, debris and wash waters generated during the tank closure procedures. All residual materials shall be disposed off-site, at a permitted recycling/disposal facility.

F. The Contractor shall provide the Subconsultant with the laboratory analytical data and transportation documentation prior to off-site disposal. The Subconsultant shall review and compare the data to the designated disposal facility's operating permit. The Subconsultant shall also review and forward the transportation documentation to the Authority for endorsement prior to off-site disposal.

G. An acceptable material for purging the tank and associated piping of combustible gases is carbon dioxide. Carbon dioxide will be introduced into the tank in the form of dry ice. The Contractor shall add a sufficient amount of dry ice to the tank to ensure combustible gases are evacuated from the interior of the tank. Alternative methods to ensure that combustible gasses are evacuated may be proposed by the Contractor.

H. The Contractor shall then utilize a combustible gas indicator equipped with oxygen, lower explosive limit, carbon monoxide and hydrogen sulfide sensors to determine the atmospheric conditions on the interior of the tank.

I. The Contractor is required to follow confined space entry procedures required by local, State and Federal regulations. A confined space entry permit shall be prepared prior to allowing personnel into the identified confined space.

J. The Contractor shall clean the interior of the tank by means of applying a high-pressure steam clean wash to the sidewalls, base and surface of the tank. Cleanliness shall be determined by the absence of petroleum vapors in the interior of the tank as measured with a Photoionization Detector and/or Combustible Gas Indicator, and by wipe tests of the tank wall in which a white rag accumulates no visible petroleum residues when wiped across the tank surface.

K. The Contractor shall be responsible for the disposal of the tank and all tank system appurtenances, including but not limited to, fuel pumps, filters, vent and fill pipes, supply and return pipes connected to and from associated equipment. The tank system appurtenances shall be removed and disposed of in accordance with applicable local, state and federal regulations.

L. Should the Contractor encounter suspect or confirmed asbestos-containing materials during the removal of tank system components, the Contractor shall cease all activities specified in this Section and commence and conduct Work in accordance with Contract Specification Section 02080.

M. Should it be generated, sand and gravel backfill, and any other soil or similar material removed in the course of the work shall be stockpiled with appropriate precautions to prevent dispersion of contamination. Specifically, material that is overtly contaminated (i.e., demonstrates visual, olfactory evidence of contamination, or for which a headspace reading exceeds 100 ppm) shall be stockpiled separately from other material. All material removed for disposal shall be placed on polyethylene no less than 6 mil thick, and shall be covered with 6 mil polyethylene, suitably anchored.

N. The Contractor shall collect samples of the stockpiled sand and gravel material in laboratory prepared containers. The samples shall be properly preserved and forwarded to a laboratory for analysis in accordance with the chemical criteria and methods specified in the operating permit of the disposal facility identified in the Contractors Work Plan. The Contractor shall request a 10 business day turn around time for analysis of the samples. The Contractor shall forward the results to the Authority and Subconsultant within 24 hours of receipt from the laboratory.

O. If conditions defined in the Massachusetts Contingency Plan (MCP) as "Two Hour" or "72 Hour" notification requirements are encountered, the Contractor shall immediately notify the Authority and the Subconsultant. In the event that the Contractor is unable to contact the Authority or the Subconsultant within the required notification period, the Contractor's Licensed Site Professional (LSP) is authorized and directed to make verbal notification by telephone to the Massachusetts Department of Environmental Protection. The Contractor shall familiarize his field staff with the MCP definition of "2 hour" and "72 hour" reporting conditions, found at Section 40.0300 of the MCP. A written summary of the MCP definition of "2 hour" and "72 hour" notification conditions shall be posted in the field for the reference of the contractor's field staff. For the Contractor's convenience in complying with this requirements, the DEP notification telephone number and the conditions defining a "2 hour" and "72 hour" reporting condition are attached to this specification.

P. The Contractor shall clean the floors and walls of the tank room by applying a high pressure, steam clean wash or other suitable method, subject to the approval of the Authority. The wash waters shall be collected by means of a vacuum truck or transferred to 55 gallon drums. The characterization and off-site disposal of wash waters generated during tank room cleaning will be the responsibility of the Contractor.

PART 4- MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Removal and disposal of the tank(s) shall be measured on a lump sum basis, as listed. The lump sum shall include the testing, handling, transportation, labor, materials and disposal of any oils/hazardous materials and/or impacted media generated during the removal activities. Payment will be made upon Consultant's confirmation of the accepting disposal/recycling facility's weight receipts and executed transportation and disposal documentation.

1. The Removal and Disposal of Aboveground Storage Tanks will be measured as a lump sum, and payment will be made at the contract price for Item No. 0211.804 Remove and Dispose of Aboveground Storage Tanks.

2. The preparation of a Hazardous Materials Health and Safety Plan will be measured as a lump sum, and payment will be made at the contract price for Item No. 0222.363 Hazardous Materials Health and Safety Plan.

4.02 PAYMENT ITEMS

ITEM NO.	DESCRIPTION	UNIT
0211.804	REMOVE AND DISPOSE OF ABOVEGROUND STORAGE TANKS	LS
0222.363	HAZARDOUS MATERIALS HEALTH AND SAFETY PLAN	LS

DEPARTMENT OF ENVIRONMENTAL PROTECTION
(978) 661-7600

NOTIFICATION REQUIREMENTS

Two Hour Notification

- Sudden Release

- Threat of Sudden Release
- Oil Sheen on Surface Water
- Poses Imminent Hazard

- Could Pose Imminent Hazard

- Release Detected in Private Well
- Release to Storm Drain
- Sanitary Sewer Release

72-Hour Notification

- Subsurface Non-Aqueous Phase Liquid (NAPL) equal to or greater than ½ inch
- Underground Storage Tank Release
- Threat of UST Release
- Release to Groundwater near Water Supply
- Release to Groundwater near School or Residence

END OF SECTION 02083

SECTION 02090

DEMOLITION INVOLVING LEAD PAINT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the minimum work practice requirements for the removal containment, recovery, and disposal of leaded coatings and associated waste generated as a result of demolition activities as designated for Blue Line Rehabilitation Project at Maverick Station. Lead coated paint may be encountered on surfaces in specified locations as per the specifications. The intent of this section is to outline Contractor responsibilities deemed necessary to prevent the contamination of the air, soil, and water around the project site during structural demolition.

B. Attention is directed to the CONTRACT AND GENERAL CONDITONS and all sections within DIVISION I-GENERAL REQUIREMENTS which are hereby made a part of this section.

C. In addition to the requirements specified herein, refer to all Contract Documents for complete description of work required to be performed under this Section.

D. Examine all Drawings and all other Sections of the Specifications for requirements of related Sections affecting the work of this Section.

E. The work of this section shall be performed as stated herein. In performing the work of this section, the Contractor shall refer to other Sections (i.e. Section 02050 - Demolition) for additional procedures. The Contractor is responsible for the coordination of the work of this section with related work. No delays in completion of the work may be claimed for lack of coordination.

F. Contractor shall comply with all applicable local, state, and federal guidelines and regulations regarding all work involving the presence of lead-containing paint.

G. The work of this section references work of the Contractor performing the demolition. Additionally, requirements of the Contractor regarding coordination and related work are identified in this section and shall be considered the responsibility of the Contractor.

1.02 DESCRIPTION OF WORK

A. The procedures described herein apply to all demolition work where a worker may be occupationally exposed to lead as well as to the disposal of the demolition debris. The Contractor shall assume that any painted surface not tested under this specification shall be assumed to contain lead paint and it shall be the Contractor's responsibility to protect workers performing under this Contract. This may require additional testing by the Contractor to verify lead content.

B. The Contractor shall assume full responsibility for the compliance with all applicable Federal, State and Local regulations pertaining to work practices, hauling and disposal of hazardous waste, protection of workers and visitors to the site, and persons occupying areas adjacent to the site. The Contractor shall hold the Authority harmless for failure to comply with any applicable work, hauling, disposal, safety, health or regulation on the part of himself, his workers or his subcontractors.

C. The Contractor is required to ensure the protection of workers performing any related demolition work that will affect surfaces coated with lead containing paint as well as protecting the public and the environment from exposure to lead dust.

D. Contractor responsibilities established in this Section include the furnishing of all labor, materials, and equipment required to test, remove, contain, recover, and dispose of lead coatings and associated waste as called out in these specifications.

1. Removal of paint from structural steel, where cutting/grinding is necessary;

2. Spot removal of paint from surfaces to facilitate demolition;

3. Removal of all temporary containment system structures daily, or as allowed by Subconsultant;

4. Testing and disposal of all demolition debris generated as a result of lead coatings removal and demolition in accordance with requirements of this specification and federal and State regulations on hazardous and solid waste;

5. Personal air sampling as required by OSHA for workers of the contractor or the MBTA that have the potential for exposure to airborne lead dusts as outlined in this specification.

E. Codes and Standards

1. All work shall conform to the standards set by applicable Federal, State and local laws, regulations, ordinances, and guidelines in such from in which they exist at the time of the work of the contract and as may be required by subsequent regulations,

2. In addition to any detailed requirements of the Specification, the Contractor shall at his own cost and expense comply with all laws, ordinances, rules and regulations of Federal, State, Regional and Local Authorities regarding handling and storing of lead waste material.

3. The following references are cited as applicable standards and regulations as amended; and may not include all applicable standards and regulations:

a. Code of Federal Regulations (CFR) Publications:

29 CFR 1910	General Industry
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts and Mists

29 CFR 1926.57	Ventilation
29 CFR 1926.62	Lead in Construction
29 CFR 1926.200	Signs, Signals and Barricades
29 CFR 1926.354	Welding, Cutting and Heating in Way of Preservative Coatings
29 CFR Subpart T	Demolition
40 CFR 50	National Primary and Secondary Ambient Air Quality S Standards for Lead
40 CFR 61 Subpart A	General Provisions
40 CFR 61.152	Standard for Waste Manufacturing, Demolition, Renovation, Spraying, and Fabricating Operations.
40 CFR 241	Guidelines for the Land Disposal of Solid Wastes
40 CFR 257	Criteria for Classification of Solid Waste
40 CFR 261 and 262	Waste Disposal Facilities and Practices

b. Massachusetts Regulations:

310 CMR 30.00	Massachusetts Hazardous Waste Regulations
310 CMR 40.00	Massachusetts Contingency Plan
454 CMR 23.00	Occupational Lead Exposures

c. American National Standards Institute (ANSI) Publications:

29.2-79	Fundamentals Governing the Design and Operation of Local Exhaust Systems
288.2-80	Practices for Respiratory Protection

d. National Institute of Occupational Safety and Health (NIOSH) Publications:

Manual of Analytical Methods, 4th Edition

e. Underwriters Laboratories, Inc. (UL) Fire Resistance Directory Publications:

586-77 (R 1982) Test Performance of High Efficiency Particulate Air Filter Units

4. All regulations by the above and other governing agencies in their most current version are applicable throughout this project. Where there is a conflict between this Specification and the cited State, Federal, or Local regulations, the more restrictive or stringent requirements shall prevail.

F. THIS SECTION REFERS TO MANY REQUIREMENTS FOUND IN THESE REFERENCES, BUT IN NO WAY IS IT INTENDED TO CITE OR REITERATE ALL PROVISIONS THEREIN OR ELSEWHERE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO KNOW, UNDERSTAND, AND ABIDE BY ALL SUCH REGULATIONS AND COMMON PRACTICES.

1.03 DEFINITIONS

A. The following definitions apply to performance of the work of this project

1. Action Level: An airborne concentration of lead above 30 micrograms per cubic meter (ug/m3) as a time-weighted average (TWA) for more than 30 days per year.

2. Area Monitoring: Sampling of lead concentrations *within* the demolition work area and outside the work are which is representative of the airborne concentrations of lead.

3. Clean Room: An uncontaminated change room directly adjacent to the work are having facilities for storage of employees' personal clothing and uncontaminated work clothes, materials and equipment provided when the airborne exposure to lead is above the PEL.

4. Contractor or Demolition Contractor: The Sub-Contractor who is performing demolition involving lead containing paint under this Section.

5. Consultant: Authorized representatives who are under contract with the Authority or Subconsultant to perform Lead Paint Consulting services.

6. Decontamintion Area: A contained area adjacent to or connected to the abatement work area and consisting of an equipment room, shower area, and clean room which is used for decontamination of workers, materials and equipment.

7. HEPA Filter Equipment: High efficiency particulate air (HEPA) filtered vacuuming or exhaust ventilation equipment with a UL 586 filter system. Filters shall be of 99.97 percent efficiency for retaining 0.3 micrometer diameter particles as determined by DOP testing.

8. Lead Containing Paint or Coating: Paint, varnish, or stain which contains lead in excess of 0.0 milligrams per square centimeter (mg/cm1 or 0.0 % lead by weight).

9. Lead Permissible Exposure Limit (PEL): 50 ug/m3 of air, based upon an 8-hour time weighted average.

10. PM-10 Sampling: Sampling for suspended particulate matter less than 10 microns in aerodynamic average.

11. Sample Location: Area or place where an air sample is collected.

12. Subconsultant: Environmental Professional (ATC Associates Inc.) employed by Consultant.

13. Surface Preparation: Paint removal such that surfaces are free of visible paint chips, dirt, and rust where cutting, torching, welding, etc. may be required to facilitate demolition.

    a. Time Weighted Average (TWA): The TWA is an 8-hour time weighted average for the test of the concentration of lead for worker exposure.

    b. TSP Sampling for Lead: Sampling for airborne total suspended particulate with lead analysis.

    c. Wet Cleaning: The Process of removing lead contamination from building surfaces, equipment and other objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as lead contaminated wastes.

    d. Work Area: A controlled-access work area which has not plastic sheeting or other containment barriers erected to separate the trades.

1.04 SUBMITTALS

A. Notifications

1. Provide in proper and timely fashion, all necessary notifications to relevant federal, state, and local authorities and obtain and comply with provisions of all permits or applications required by the work specified as well as make all required submittals required under those auspices. Contractor shall indemnify Authority, Subconsultant and Consultant from, and pay for all claims resulting from failure to adhere to these provisions. Costs for all permits, applications, and the like are to be assumed by Contractor. Required notifications include, but are not limited to, the following:

    i. Massachusetts Department of Environmental Protection, Form AQ06 – Construction/Demolition Notification.

14. Provide five (5) copies of the following Submittals at the Pre-Construction Conference for the review of the Authority and Subconsultant:

1. Copies of all notifications, permits, applications, licenses and like documents required by Federal, State, or Local regulations and this specification obtained or submitted in proper fashion,

2. List of total number of supervisors and workers intended to be assigned to the project, including name and lead awareness qualifications,

3. Copies of written medical opinions for each employee who may be occupationally exposed to lead as required by 29 CFR 1926.62 (j)(3)(v),

4. Record of successful respirator fit testing performed by a qualified individual within the previous 12 months for each employee to be used on this project with the employee's name and social security number with each record,

5. Employer's Lead Compliance Program as required by 29 CFR 1926.62, including proposed respiratory protection program and medical monitoring for all employees throughout all phases of the job, including make, model and NIOSH approval numbers of respirators to be used; worker orientation plan; written description of all proposed procedures, methods, or equipment to be utilized, including those that my differ from the Contract Specifications. In all instances, Contractor must comply with all applicable federal, state and local regulations,

6. Material Safety Data Sheets on potentially hazardous materials to be used on the project,

7. Waste Disposal Plan which describes the waste stream and the disposal means (i.e. landfill, recycle, etc.) and includes the name, address and ID number of the proposed hazardous waste hauler, waste transfer route, and proposed disposal reclamation or treatment facility,

8. Details of any proposed work platforms and or containment system design features including description and/or drawings of the following:

a. Locations, sizes, elevations, and numbers of individuals work platforms and/or enclosure systems.

b. Manner of construction, anticipated loads during operations, and load bearing capacities for each work area platform and/or enclosure system (to be reviewed by the Subconsultant to confirm the structural adequacy of each containment given Imposed loads).

c. Proposed use and engineering of any proposed contamination control features such as HEP- filtered negative pressure systems and decontamination facilities.

d. Special considerations used to protect the containment Integrity from effects of the local climate (e.g., wind, rain, snow, etc.)

e. Discussion of special permitting and construction code requirements applicable to installation of any work platform and containment system,

9. Name and Address of the proposed metal component construction debris recycling site, including letter stating such site accepts such waste,

10. Construction schedule including sequence of critical work.

15. Submit the following to the Authority and Subconsultant as a Post-Construction submittal package:

a. Copies of waste manifests and receipts acknowledging disposal of all lead waste material from the project, showing delivery date, quantity, and appropriate signature of landfill's authorized representative,

b. DEP approval for all waste reduction techniques, it utilized,

c. All personnel monitoring results,

d. All TCLP testing results.

1.05 REPORT OF FINDINGS

A. Testing for lead paint has been performed on a limited number of painted components in the areas scheduled for demolition/renovation using X-Ray Fluorescence (XRF) analysis. The results of the sampling are included in the table below. The Occupational Safety and Health Administration (OSHA) requires employers to determine the airborne concentration of lead in dust in order to determine the employee's exposure hazard while impacting these coated surfaces and requires that the contractors and their employees adhere to the OSHA Lead-in-Construction standard found at 29 CFR 1926.62. OSHA does not recognize XRF results as a means of assessing worker exposure during work impacting painted surfaces as even XRF results of 0.0 mg/cm^2 or less may expose a worker to the airborne hazards of lead depending on the type of work performed on these surfaces.

Location	Component	Substrate	Result (mg/cm^2)
Outbound			
Electrical/Fire Alarm Room	Wall	Plaster	0.0
	Door casing/jamb	Metal	0.0
	Electrical Panels	Metal	0.0
	Ceiling	Plaster	0.0
	Mounting panel	Wood	0.0
	Floor	Cement	0.0

Location	Component	Substrate	Result (mg/cm^2)
Bathroom (former)	Wall	Plaster	0.2-0.4
	Door casing/jamb	Metal	0.1
	Door	Metal	0.0
	Partitions	Stone	0.0
	Ceiling	Plaster	0.1
	Partition door	Wood	0.1
Janitor's Closet	Door	Metal	0.5
	Door casing/jamb	Metal	0.2
	Ceiling	Plaster	0.1
	Wall	Ceramic tile	0.4
	Floor	Terrazzo	0.0
Women's Bathroom	Wall	Ceramic	0.3
	Floor	Cement	0.0
	Ceiling	Plaster	0.0
	Door	Metal	0.2
	Door casing/jamb	Metal	0.1
Men's Bathroom	Wall	Ceramic	0.4
	Ceiling	Plaster	0.0
	Door	Metal	0.1
	Door casing/jamb	Metal	0.1
Track Walkers Room	Wall	Plaster	0.2
	Ceiling	Plaster	0.1
	Floor	Cement	0.1
	Shelves	Wood	0.0
	Partition	Wood	0.1
	Door	Metal	0.1
	Door casing	Metal	0.3
	Grate	Metal	0.9
Signal Room	Window trim	Wood	0.9-1.3
	Window sash	Wood	1.8-2.4
	Walls	Plaster	0.4
	Ceiling	Plaster	0.2
	Door casing	Wood	0.8
	Door	Wood	1.0
Platform Area	Walls	Yellow tile	9.9
	Walls	Blue tile	0.0
	Walls	Blue/Green tile	9.9
	Floor	Brick	0.0
	Signs	Metal	0.0
	Ceiling	Plaster	0.1
	Security railings	Metal	0.6
	Benches	Wood	0.0
	Bench supports	Metal	0.5
	Doors	Metal	0.0-1.0

Location	Component	Substrate	Result (mg/cm^2)
	Door casings/jambs	Metal	0.1-1.0
South Portion of Station (Outbound/Inbound)			
(Unoccupied Platform)	Columns	Plaster	0.0-0.6
	Beams	Plaster	0.2-0.4
	Standpipe	Metal	0.1
	Door	Metal	0.0
	Door casing/jamb	Metal	0.0
	Stair walls	Plaster	0.0
	Tunnel walls	Plaster	0.2
	Storage Tank	Metal	0.4
	Railings/Fences	Metal	2.6
Equipment Building	Door	Metal	0.0
	Door casing/jamb	Metal	0.0
	Walls	Concrete block	0.0
	Floor	Cement	0.0
	Ceiling	Cement	0.0
Inbound Side			
Work/Locker Room	Walls	Plaster	0.3-0.8
	Door	Metal	0.3
	Door casing/jamb	Metal	1.2
	Support column	Cement	1.0
	Floor	Concrete	0.0
	Conduit	Metal	0.2
	Shelves	Wood	0.0
Inspectors Office	Floor	Concrete	0.0
	Walls	Plaster	0.3
	Door	Wood	0.3
	Door casing/jamb	Metal	0.4
	Conduit	Metal	0.2
Old Relay Room (lower level)	Floor	Cement	0.0
	Ceiling	Plaster	0.3
	Door	Metal	0.0
	Walls	Plaster	0.1-0.3
	Stair treads	Cement	0.0
	Stair risers	Cement	0.0
	Railing	Wood	0.1
Pump Room	Door	Wood	0.0
	Door casing/jamb	Wood	0.0
	Walls	Plaster	0.0
Bathroom	Wall	Plaster	0.4-0.6
	Ceiling	Plaster	0.2
	Door	Metal	0.2
	Door casing/jamb	Metal	0.6

Location	Component	Substrate	Result (mg/cm^2)
Communications Room	Walls	Plaster	0.2
	Shelving	Wood	0.0
Electrical Room	Walls	Plaster	0.3
	Ceiling	Plaster	0.2
	Door	Metal	0.0
	Door casing/jamb	Metal	0.2
Area Under Escalator	Door	Metal	0.4
	Door frame	Metal	0.8
	Walls	Plaster	0.3
	Columns	Plaster	0.2
	Floor	Cement	0.0
Token Booth Area	Token booth	Metal	0.0
	Turnstile	Metal	0.3
	Floor	Concrete	0.0
	Ceiling Structural Steel	Metal	4.5
	Walls	Plaster	0.2
	Signs	Metal	0.0
	Wall	Brick	0.0
	Ceiling	Plaster	0.1
	Escalator	Metal	0.0
	Stair treads	Cement	0.0

B. The Contractor must be thoroughly familiar with the lead paint conditions. The responsibilities established in this section include the furnishing of all labor, materials, and equipment required to remove, contain, recover, and dispose of LBP and associated waste identified in these specifications, including the spot removal of paint from surfaces to facilitate demolition.

All lead-based painted surfaces associated with the renovation/demolition work are included in the scope of work. It is the Contractor's responsibility to familiarize himself with existing conditions and the extent of painted surfaces at the project site.

Testing results also indicate that ceramic tiles, which are located on the platform level walls and ceilings, the ceiling area between the tracks, and the sides of the stairwells leading to the platforms contain lead. Contractor shall handle and dispose of this material in accordance with all state and federal regulations governing lead-containing products.

1.06 GENERAL WORK PROCEDURES

A. Work shall be carried out in sequential phases. Inspection and approval of each phase by the Consultant shall be sought and gained before proceeding to the next phase and in accordance with the schedule agreed upon by the Authority at the Pre-Construction meeting as amended. This shall include demolition requirements for work area clearance and work

area release prior to Contractor work. As a Contract requirement, any reasonable delay caused by this requirement will not constitute a basis for claim against the Authority, Consultant, or Subconsultant. Contractor must coordinate the work of this section with the work of all other trades.

B. At no time will Authority permit storage of debris generated from demolition activities to be stored inside buildings at the site, and any storage of materials will be subject to Authority's approval. Assure security of debris at all times.

1.07 SPECIAL CONSIDERATIONS

A. Work Affected – In general, the following activities are minimum requirements of this section and affect the demolition performed on the painted components:

1. No torch cutting, mechanical sanding or stripping, or abrasive methods of paint removal shall occur until the employer performs an employee exposure assessment as required under 29 CFR 1926.62 and determines actual employee exposure. The employer shall provide to employees performing these tasks with interim protection as follows and according to 29 CFR 1926.62:

   a. Appropriate respiratory protection,
   b. Appropriate personal protective clothing and equipment,
   c. Change areas,
   d. Hand washing facilities,
   e. Biological monitoring to consist of blood sampling and analysis for lead and zinc protoporphyrin levels, and
   f. Training as required regarding 29 CFR 1926.59, Hazard Communication; training as required regarding use of respirators; and training in accordance with 29 CFR 1926.21, Safety training and education.

2. Workers shall be informed of the components to be demolished that have been identified as containing lead.

3. Separation of Trades: Unprotected, untrained workers or trades shall not perform any related work within the same vicinity as demolition involving components identified with lead.

1.08 FEES, PERMITS & LICENSES

A. The Contractor shall pay all licensing fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or process in the performance of the work specified in this section. The Contractor shall be solely responsible for costs, damages, or losses resulting from any infringement of these patent rights or copyrights. The Contractor shall hold the Authority harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights. If the Contract Specification requests the use of any product, design, invention, or process that requires a licensing, patent or royalty fee for use in the performance of the job, the Contractor shall be responsible for the fee or royalty fee and shall disclose the existence of such rights.

B. Contractor shall be responsible for costs for all applicable licensing requirements, notification requirements, and all other fees related to the Contractor's ability to perform the work in this Section.

C. Contractor shall secure all necessary permits for work under this Section, including hauling, removal, and dispose, fire and materials usage, or any other permits required to perform this specified work.

1.09 CLEAN-UP

A. Maintain the work site in a neat and orderly manner at all times, so as not to interrupt or infringe upon the work of other trades.

B. Comply with all requirements for release of work area as described in the project specification.

C. It is the perogative of the Authority and Subconsultant to inspect whenever deemed necessary and the Contractor is responsible for meeting and correcting any deficiencies discovered which do not meet the current applicable regulations and requirements of these specifications.

1.10 COORDINATION

A. Extend full cooperation to Authority in all matter involving the use of Authority's facilities. At no time shall Contractor cause or allow to be caused conditions which may cause risk or hazard to the general public or conditions that might impair safe use of the facility. The use of the facility's electricity, water or like utilities by the Contractor shall be as specified in Division One of the specifications.

B. Coordinate the work of this section with that of all other trades. Phasing and scheduling of this project will be subject to the approval of the Authority. The work of this Section shall be scheduled and performed so as not to impede the progress of the project as a whole. Work shall not proceed in any area without the express consent of the Authority. The Contractor shall be available within 24 hours notice of additional work if after acceptance of the work it is found that complete demolition was not achieved from the initial work effort as determined by the Authority or Subconsultant.

C. Unless specifically authorized by the Authority, the work of this project shall be conducted according to the hours established in Division 1.

D. Inspections by Consultant: The Consultant may perform visual inspections during the work of this section, as described below. Contractor shall not proceed with work until Contractor has received Consultant's approval at the stages identified below:

1. During: Prior to the commencement of a proposed alternative method other than specified.

2. Post Inspection: At the completion of work and final clean-up, prior to clearance or removal of any critical barriers and decontamination unit from the work area.

3. Waste Removal Inspection: Prior to removal of hazardous waste from the site, Authority and Consultant will inspect the quantity and type.

1.11 AUTHORITY TO STOP WORK

A. The Authority has the authority to stop the demolition work, at any time the Authority determines either personally or through the services of the Authority's retained Consultant, that conditions are not within the specification and applicable regulations. The stoppage of work shall continue until conditions have been corrected and corrective steps have been taken to the satisfaction of the Consultant. Standby time required to resolve violations shall be at the Contractor's expense, and shall not be cause for extending the completion date.

1.12 EMERGENCY PRECAUTIONS

A. The Contractor shall establish emergency and fire exits from the work area.

B. When an injury occurs, the Contractor shall stop work until the injured persona has been removed from the work area.

1.13 DISPOSAL OF WASTE MATERIAL

A. General

1. Demolition Contractor and transporting Contractor will be required to comply with the Resource Conservation and Recovery Act (RCRA) and with all applicable state and local regulations.

2. Demolition Contractor shall be responsible for disposing all waste determined by Toxicity Characteristics Leachate Procedure (TCLP) to be hazardous. If TCLP testing has not been performed, the Demolition Contractor shall be responsible for testing the waste and the costs associated with the testing and analysis.

3. Demolition Contractor shall comply with all EPA regulations.

4. The cost for the correct disposal of all waste of this project shall be included in the base bid and shall be disposed according to 40 CFR 241, -261, and –262. .

5. Salvage (scrap) all metal components removed under this Contract. Submit proof of delivery to salvage facility.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Contractor shall deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer, and details for proper storage and use.

B. All materials or equipment delivered to the site shall be unloaded, and temporarily stored, and transferred to the work area in a manner which shall not interfere with other trades working in the area.

C. Unloading and temporary storage sites, and transfer routes, must be approved in advance by the Authority.

D. Damaged or deteriorated materials may not be used and must be promptly removed from the premises. Material which becomes contaminated shall be packaged and legally disposed in an approved, secure landfill.

2.02 MATERIALS

A. All materials and equipment proposed to be used on this project shall be subject to the acceptance of the Authority, Subconsultant and the Consultant. The list of required materials shall include, but not necessarily limited to the following:

1. Fire retardant polyethylene sheeting, minimum thickness of six (6) mil.
2. Plastic bags, minimum thickness of six (6) mil.
3. High quality duct tape.
4. Lead Warning Signs, as required by the DLWD Regulations, and OSHA Hazard Communication requirements.
5. Spray adhesive (fire retardant).
6. Personal Protective Equipment, NIOSH approved respirators and filters.
7. Ventilation units with HEPA filtration and exhaust fans.
8. HEPA vacuums.
9. Trisodium-Phosphate (TSP) and product data.
10. Cloth tarpaulin.
11. Chemical strippers, where applicable, not containing methylene chloride and/or flammable materials.
12. Other materials, tools, and equipment necessary for the work.

PART 3 – EXECUTION

3.01 SCHEDULING

A. The Contractor shall coordinate all scheduling with the Authority. A schedule of work shall be submitted to the Authority, prior to contract performance.

3.02 UTILITIES

A. Provide all necessary connections for temporary utilities in the work place during work. Shut down and disconnect all electrical power to the work area so that there is no possibility of reactivation and electrical shock during the work. The temporary electrical power shall be in accordance with all OSHA requirements.

3.03 IDENTIFICATION OF HAZARDS

A. Prior to any work involving lead containing items, the contractor shall identify all work activities in which a worker may be occupationally exposed to lead.

B. The Contractor shall initially determine if any worker may be exposed to lead above the action level.

3.04 BARRIERS, ISOLATION AREAS AND INSTALLATION OF DECONTAMINATION FACILITIES

A. Containment controls, including critical barriers, protective coverings, HEPA-filtered ventilation and decontamination facilities, may be required for paint removal work. The degree of containment shall be appropriate for the anticipated levels of airborne lead dust. The lower the level of airborne lead, the lesser the requirements necessary to control lead emissions at the job site.

B. Work Area Isolation (unless exempted according to Paragraph A)

1. The Contractor shall isolate work areas for the duration of work by completely sealing off all openings in the work area. Isolation sealing shall be accomplished by constructing critical barriers where necessary around the work area perimeter. The work area shall be sealed airtight to the greatest extent possible, subject to the approval of the Consultant.

2. Provide temporary power and lighting (with ground fault circuit interrupt protection) to the work areas and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements, and OSHA requirements for temporary lighting in the environment normal to lead-based paint abatement work areas.

C. Equipment and Services: The Contractor shall provide portable lighting, staging and scaffolding, utility hook-ups, portable fire extinguishers, first aid equipment, and all other equipment or items for the safe and efficient performance of work.

D. Decontamination Facility:

1. The Contractor shall erect one or more Decontamination Facilities (if applicable) to serve each work area. The facility will consist of a series of two or more connected chambers including, at a minimum, a clean rooms and a shower/wash room, separated by an air lock. Unless otherwise specified, the shower/wash room shall be contiguous to the work area. Non-contiguous, remote, three-chamber decontamination facilities may be substituted with the Consultant's prior written approval. Three- Chamber decontamination facilities shall include an equipment room to be used for removal and temporary storage of contaminated work clothing, equipment, and other items leaving the work area, prior to decontamination in the shower/wash room of the decontamination facility.

2. In all cases, non-emergency access between contaminated and uncontaminated rooms or areas shall only be through the Decontamination Facility/Wash room.

3. Ensure that barriers and linings are effectively sealed and taped at all times, and that the Shower/Wash Room floor is completely water tight. Repair damaged barriers, and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning of each work period.

E. All lead in demolition work areas shall remain isolated from all other trades on the project and remain inaccessible to the public. Contractor shall monitor the access to the demolition work areas. The below listed items are required to control the generation of lead -containing dust during demolition activities. The Contractor is ultimately responsible for cleaning all generated dust and paint debris from demolition operations and must maintain work areas free from lead dust generated from demolition activities.

1. Signs shall be posted at all approaches to the work areas warning that work involving lead is being conducted in the vicinity. Signs shall be in bold lettering not smaller than two inches tall.

2. Barriers shall not be removed until the work areas are thoroughly cleaned and approved by the Consultant.

3.05 PAINT REMOVAL

A. Paint Removal: This shall include the removal of paint from all metal surfaces where torch cutting or welding is required to allow installation of new materials and/or modifications/demolition of existing as specified and/or where shown on the drawings. Paint removal shall follow the below listed requirements:

1. Paint removal shall occur to remove all visible paint down to the bare substrate. The paint shall be removed from an area of at least eight (8) inches where cut lines or welding is to occur at all surfaces of the member. Contractor shall coordinate with the General contractor where the cut lines and welding are to occur.

2. The following methods are prohibited for use in lead paint removal on this project:

a. torch or flame burning,

b. dry abrasive blasting using sand, grit or any other particulate,

c. on-site use of methylene chloride or solutions containing methylene chloride,

d. machine sanding.

3. Contractor shall seek Authority, Subconsultant, and Consultant approval for the use of chemical strippers/caustic paste on this project.

4. All paint chips, slurry, waste, and debris generated from paint removal shall be removed upon generation during the work.

5. Paint removal shall occur only when proper barriers and protection are in place and approval has been given regarding barrier set-ups and methods of paint removal.

3.06 PERSONAL SAMPLING - CONTRACTOR

A. Perform personal air sampling during all demolition work to determine worker exposure limits. The results of such sampling shall be posted, provided to individual workers, and submitted to the Authority and Consultant as described herein.

B. Provide sampling to check personal exposure levels. Representative sampling shall be taken for the duration of the work shift or for eight hours, whichever is less. Personal samples need not be taken for repeated working conditions if working conditions remain unchanged, but must be taken every time there is a change in the removal operation, either in terms of the location or the type of work. Sampling will be used to determine eight-hour Time-Weighted-Average (TWA). Personal Sampling shall be as outlined in OSHA Standard 29 CFR 1926.62.

C. Air sampling results shall be transmitted to the Authority and individual workers available at the job site in written form no more than forty-eight (48) hours after the completion of a sampling cycle. The reporting document shall list each samples result, sampling duration, sample yield, cassette size, and analysts name and company, and shall include an interpretation of the results. Air sample analysis results will be reported in micrograms/cubic meter (ug/m3).

D. The Contractor's testing lab shall be AIHA accredited for analysis of metals. Contractor shall submit for Authority's review and acceptance the name and address of the laboratory, certification(s) of AIHA accreditation for metal analysis, listing of relevant experience in air lead analysis, and presentation of a documented Quality Assurance and Quality Control program.

E. Air monitoring frequency will be established in accordance with the requirements set forth in 29 CFR 1926.62.

3.07 EVIRONMENTAL IMPACT TESTING AND INSPECTIONS

A. Ambient Air Monitoring

1. The Authority and Contractor shall be responsible for performance of all ambient air monitoring required in accordance with 40 CFR 50.12, "National Primary and Secondary Ambient Air Quality Standards for Lead". The Authority and Contractor shall be responsible for retaining a qualified Industrial Hygiene firm for performance of the ambient air monitoring services as necessary.

B. After a thorough clean-up, the Consultant will visually inspect the work area for the detection of any visible debris or contamination. If the visual inspections do not reveal any debris or any signs of contamination, the area shall be cleared.

3.08 WORK PROCEDURES

A. The contractor shall initiate, and continue, sufficient engineering and work practice control, as described in their Contractors Lead Compliance Program, the project Health and Safety Plan, and the Work Plan, to reduce and maintain worker exposures to lead at or below the Action Level.

B. The following work practices are specifically required by these specifications:

1. All persons except those directly involved in the work shall be excluded from the work area. Physical barriers shall be used, where necessary, to limit access to the work area for the duration of the demolition operations.

2. Provide hand washing facilities and assure that all workers thoroughly wash their hands and face upon exiting the work area. Workers shall pay careful attention to cleanse the hands and face when decontaminating.

3. Thoroughly wet the areas to be demolished and mist the air to reduce the potential for creating airborne lead and dust.

4. All equipment used by the workers inside the work area shall be either left in the work area of thoroughly decontaminated before being removed from the area. Extra work clothing (in addition to the disposable suits supplied by the Contractor) shall be left in the clean area until the completion of work in that area. The clean area shall be cleaned of all visible debris and disposable materials daily.

5. Under no circumstances shall workers or supervisory personnel eat, drink, smoke, chew gum, or chew tobacco in the work area; to do so shall be grounds for the Consultant or Subconsultant to stop all demolition operations. Only in the case of life threatening emergency shall workers or supervisory personnel be allowed to remove their protective respirators while in the work area. In this situation, respirators are to be removed for as short a duration as possible.

3.09 STORAGE OF WASTE

A. Use of waste containers on site shall be controlled under the following requirements:

1. Location of waste containers on site shall be coordinated with the contractor, subject to Authority's approval.

2. The waste containers shall be lined with two layers of six-mil polyethylene sheeting, be solid, enclosed containers, locked and sealed at all times. This requirement applies to waste classified as hazardous based on TCLP testing.

3. Contractor shall comply with all federal, state, and local regulations and ordinances regarding lead waste storage.

PART 4 – MEASURE AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement: Work specified in this Section for Remove Lead Paint will not be measured but will be paid for under an allowance for Item 0212.152. The allowance will be adjusted to the actual amount paid for all such work. The Contractor shall furnish itemized statements of the work performed and give the Engineer access to accounts, bills, and vouchers relating thereto, and unless the Contractor does furnish such itemized statements, bills, and vouchers, he shall not be entitled to payment for the related work. The allowance will be made to reimburse the Contractor for all services required for the work specified herein.

B. Payment: Payment for the work of this Section will be based on itemized statements furnished by the Contractor to the Authority without any mark-up for overhead or profit. No other costs will be paid for work of this Section.

C. Payment Item:

ITEM NUMBER	DESCRIPTION	UNIT
0212.152	REMOVE LEAD PAINT	AL

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies site preparation in accordance with Standard Specification Construction Section 02100, except as modified herein.

PART 3 - EXECUTION

3.04 REMOVAL

E. Remove designated street signs as follows:

1. Remove signs complete, including the supports.

2. Stack sign panels along with the supports in an area designated by the Engineer.

3. Reinstall sign panels and their supports at the same location where they were removed.

F. Remove and dispose, off site, existing chain link fence which interferes with construction, as indicated, or as directed by the Engineer.

3.05 SALVAGE

D. Stack materials to be salvaged in an area designated by the Engineer and notify the Owners for pick-up. Dispose of the remaining materials not picked up by the Owners.

3.07 PREPARATION OF EXISTING PAVEMENT

A. Prior to the removal of the existing bituminous concrete pavement and base and the existing cement concrete walkways, the existing bituminous concrete pavement and base and cement concrete walkways will be cut vertically with a saw. The saw cutting will be in a straight line for the full depth of bituminous concrete pavement and base and cement concrete to be removed. No irregular or ragged edges will be permitted.

B. At locations where new bituminous concrete pavement will abut existing bituminous concrete pavement, prepare the existing pavement edge by saw cutting in a neat, straight line, for the full depth of the pavement and the base. The existing bituminous concrete wearing/binder pavement will be saw cut six (6) inches back from the existing bituminous concrete pavement base. No irregular or ragged edges will be permitted.

3.08 VENTILATION SHAFT B3 & UNIT SUBSTATION B2

A. Site preparation shall include removal of ballast, debris, abandoned equipment and tunnel cleaning at Ventilation Shaft B-3 as shown on the drawings. At Unit Substation B2, site preparation shall also include, but is not limited to, removal and resetting of concrete bollards and chains. The Contractor shall restore or replace any surface features damaged during construction to their original condition upon completion of the work.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Site preparation shall be paid for on a lump sum basis.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0220.098	SITE PREPARATION	LS
1042.111	SIGNS REMOVE AND STACK	LS

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies earthwork, including excavation; placement of backfill; construction of embankments; disposal of surplus excavated material (except such materials that are determined to be hazardous); salvaging of topsoil; and fine grading and compacting in accordance with Standard Specification Construction Section 02200, except as modified herein.

D. Temporary Controls: Section 01560

E. Rodent Control: Section 01565

F. Site preparation: Section 02100

G. Blasting will be prohibited.

H. Support of Excavation Section 02295

I. Excavated material, determined to be hazardous, shall be disposed of, and paid for, in accordance with the applicable requirements of Sections 02080, 02081, 02082, 02083, and 02090.

1.02 CLASSES OF EXCAVATION

A. Unclassified Excavation: Removal of all materials not being removed under other pay items which are encountered within the Limits of the Contract regardless of the nature of materials encountered. This includes the excavation for existing subway tunnel, head house construction, and ventilation shaft demolition and reconstruction; roadway and muck excavation; excavation relating to full depth pavement; excavation of underground pipes, conduits, manholes, catch basins, utility structures, underground tanks, utility and/or light poles and appurtenances, pilings, rails, ties, cobblestones, concrete walls and/or slabs, concrete not defined as rock excavation, topsoil in fill areas, organics, unsuitables or any other materials which interferes with the construction indicated; detour excavation including fill, pavement, curb, and sidewalk; and the disposal offsite of these excavated materials not required or not suitable for backfill or embankment. Unclassified Excavation also includes the removal and disposal of saturated and unsaturated mixtures of soil, organic and soil, and other material not suitable for bearing material, as determined by the Engineer, regardless of moisture content.

C. Rock Excavation

3. Materials:

c. Masonry and concrete structures, which are not specified to be removed under Section 2050, Demolition, including man made items of greater than 1 cubic yard in volume such as footings, retaining walls, concrete walls, former earth supporting structures,, granite blocks, and/or slabs which require use of hoe rams, rippers or hand power tools such as jackhammers for removal.

F. Trench Excavation

2. Class B Trench Excavation: Removal and satisfactory disposal of all materials for the construction of utilities, drainage, sewer and water pipes. Class B trench excavation does not include removal of materials classified as rock excavation.

3. Class A Trench Excavation is for test pit excavation, backfill and compaction for the purpose of locating existing underground items, structures, pipes and utilities.

O. Excavated Materials

1. All suitable materials obtained from the excavation will be used either in the formation of embankments or for backfill over, under and/or around structures, pipes and/or conduits and at such other places as directed. The material will be placed and compacted in a manner conforming to the Specification for the particular type of work required without additional compensation.

2. It will be the Contractor's responsibility to obtain from the Engineer approval for the use and placing of various materials (ordinary and gravel borrow) encountered in the excavation.

P. Compacted Backfill

1. Excavated materials reused on the Project meeting the minimum requirements of gravel borrow and compacted as specified herein.

Q. Waste

1. Materials from all classes of excavation which are determined as unsuitable for reuse on this Project by the Engineer.

2. Any surplus of suitable excavated materials after completing the formation of embankments, slopes, backfilling or stockpiling of suitable materials as directed.

1.03 QUALITY CONTROL

A. Control Testing and Inspection: The Contractor will make such tests, in accordance with the methods specified in paragraph B below, as are deemed necessary to determine compliance with these Specifications. Persons performing tests and inspections shall be appropriately qualified. The qualifications of the persons or Agency performing these tests shall be forwarded to the Engineer for approval.

D. Source of Supply: No earthwork materials will be accepted on the jobsite without written approval from the Engineer. The Contractor shall perform sufficient tests and inspections necessary to determine the acceptability of the source of supply. A Certified Testing and Inspection Agency may be used to perform such tests and inspections. The qualifications of the person or agency performing these tests and inspections shall be forwarded to the Engineer for approval. Subsequent to this approval, test results showing the acceptability of the source of supply, shall be forwarded to the Engineer for approval.

E. Sampling, testing and approval of materials shall be by the Materials Testing Laboratory personnel. Allow a minimum of two weeks for notification and approval of materials source. The Engineer reserves the right to perform inspections and tests at any time during the execution of the work.

F. Notification Point: The Contractor shall give the Engineer two (2) days notice in advance of control tests and inspections.

1.04 SUBMITTALS

A. Prior to earthwork operations, the Contractor shall submit the qualifications of the persons or agency approving the source of supply of materials and control testing and inspection.

B. The Contractor shall submit, prior to the execution of earthwork activities, a plan describing the earthwork operations including the frequency and location of tests and inspections. No work shall be performed until this plan has been approved by the Engineer.

C. The Contractor shall submit the results of all sources of supply and control inspections and tests.

D. Proposed truck routes.

E. Excavation procedures.

1.05 JOB SITE CONDITIONS

A. Temporary construction easements have been granted to the Authority by private owners for the purpose of allowing the Contractor to complete the excavation and Project. The Contractor will conduct his construction operations in accordance with the following:

1. The Contractor will restrict his work to inside the limits of work shown on the Contract Drawings.

2. Any additional area beyond the limits of work shown on the Contract Drawings, which the Contractor may require, will be secured by the Contractor at the sole expense and responsibility of the Contractor. Written evidence, thereof, will be furnished to the Engineer.

B. The Contractor will take the necessary measures and precautions to secure the excavation/construction area from intrusion by unauthorized persons. The Contractor will be responsible for the safety of all persons in the excavation/construction area as specified in Section 00700, Article 5.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ordinary Borrow: Material satisfactory to the Engineer, having properties such that it may be readily spread and compacted to form backfill and embankment, containing no organic matter, trash, building rubble or fragments greater than six (6) inches in the largest dimension, and conforming to the following:

1. Percent Passing No. 200 Sieve: 35 maximum

2. Liquid Limit: 40 maximum

3. Plasticity Index: 10 maximum

C. Gravel Borrow

2. Maximum Size of Stone: Type C - 2 inches largest dimension.

3. Gravel borrow will be obtained by the Contractor from a source approved by the Engineer.

G. Backfill

1. Suitable materials from the excavation meeting the minimum requirements of gravel borrow, except where other materials are indicated.

H. Screened gravel or 1/2 inch broken stone will conform to subsection M2.01.5 as specified in the MHD Standard Specifications for Highways and Bridges.

I. 3/4" washed crushed stone shall be uniformly blended according to the following requirements:

Square Opening Sieve	% by weight passing through
1"	100%
3/4	90-100%
1/2"	10-50%
3/8"	0-20%
No. 4	0-5%

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

C. Use of Materials Found on the Site

5. Suitable excavated materials will be used and exhausted prior to obtaining borrow for the material off site.

6. Stockpiled materials shall not be placed on top of, or adjacent to, existing tunnel structures so as to produce surcharge loads in excess of 600 pounds per square foot. Stockpiled materials shall also not be placed adjacent to existing building foundations, excavations, and/or support of excavations.

I. Subgrade Protection

1. Subgrade soils are particularly susceptible to disturbance by construction equipment. The Contractor will exercise particular care when excavating, fine grading, and placing and compacting gravel borrow so as not to disturb subgrade soils.

2. Equipment operating within the contract limits will be of size, weight and operated in such a manner that does not disturb the subgrade soils. Subgrade soils which are suitable in their natural state, but which become disturbed during the construction operation, will be replaced with compacted gravel borrow at no additional expense to the Authority.

J. 3/4" crushed stone shall be thoroughly washed with potable water to remove excess fines prior to installation, and shall be installed, leveled and compacted to depths and grades according to drawings.

3.03 EXCAVATION

A. General Requirements

4. Remove unstable bottom material when such removal is approved by the Engineer. Remove large stones, debris and soils designated by the Engineer as unsuitable from excavation bottoms. Where required by the Contract Drawings or when approved by the Engineer to excavate to rock, it shall be understood to mean sound bed rock. Remove friable and unsound material.

9. Protect bottoms of excavation from frost. Do not place and compact backfill or embankment on frozen ground.

10. The Contractor will be responsible for providing his own earth stockpiling areas for material suitable for backfilling.

E. Unsuitable Excavation

1. Unsuitable soils will be excavated to the estimated widths and depths shown on the Contract Drawings and/or so as to completely remove the organic soil from beneath structures, or as directed by the Engineer.

2. Remove soft clays or disturbed soils as directed by the Engineer.

F. Over excavation unauthorized by the Engineer will be replaced by properly compacted gravel borrow backfill using methods approved by the Engineer at the expense of the Contractor.

G. Unless otherwise shown on the Contract Drawings or directed by the Engineer, all obstructions encountered during excavation, such as abandoned structures, will be removed to a depth of not less than two (2) feet below the level of any proposed construction and will be backfilled to finished subgrade with gravel borrow.

3.05 BACKFILL

F. Backfill around manholes, pits and other structures in trenches will be placed and compacted as specified for backfill in trenches.

G. Backfill with gravel borrow where unsuitable soils have been excavated below structures.

3.06 GRADING AND COMPACTING

E. Before placing the surfacing or subbase, the subgrade will be shaped to a true surface conforming to the proposed cross section of the site work and thoroughly compacted. A tolerance of 1/2 inch above or below the finished grade will be allowed provided that this 1/2 inch above or below grade is not maintained for a distance longer than fifty (50) feet. Any portion of the subgrade that is not accessible to a roller will be thoroughly compacted with mechanical tampers or by other methods approved by the Engineer.

3.07 TEST PIT EXCAVATION

A. Dig test pits at locations as directed by the Engineer. Protect test pits by sheeting as required. When the test pit has been completed, and required samples secured and approved by the Engineer, the test pit will be backfilled and compacted as specified in paragraph 3.05 A.

3.08 EXPOSED PIPES AND CONDUITS

A. Cap/plug abandoned pipes and conduits exposed by the excavation by a method approved by the Engineer.

3.09 EXCAVATION AND BACKFILL FOR EXPANSION OF UNIT SUBSTATION B2

A. Remove and dispose of material for the construction of foundations for expansion of the existing Unit Substation B2 as shown on the drawings. Footings shall be founded at a depth of 4 feet below finish grade. Excavation shall be carried to 1 foot below the bottom of the proposed footings. Following the excavation, place geotextile fabric and 1 foot of crushed stone, minimum size ¾" to the bottom of footing. A 12 inch layer of crushed stone shall be placed beneath the slab on grade.

B. Provide excavation supports and shoring as necessary to protect adjacent structures, utilities and other facilities.

C. No fill material shall be placed on areas where free water is standing, on frozen subsoil areas or on lower subgrade surfaces which have not been previously tested and approved by the Engineer.

D. Suitable material obtained from the excavation shall be reused for backfill. Suitable materials shall include any soils that meet the requirements for Gravel Borrow. The Engineer will determine whether material is suitable for backfill.

E. Where suitable excavated material is not sufficient to complete the backfill, gravel borrow shall be used to complete backfilling.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. The following classifications of work will be measured by the cubic yard unless otherwise indicated:

1. Unclassified Excavation: Limits of unclassified excavation will be within the Contract Limits and includes all excavation not otherwise provided for under other Contract items.

5. Rock Excavation: All classes

7. Gravel Borrow and Ordinary Borrow Excavation.

13. Trench Excavation, Class A. Class A Trench Excavation is for test pit excavation.

B. No separate measurement nor payment will be made for fine grading and compacting of subgrade and all other areas required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

C. No separate measurement nor payment will be made for grading and finishing all areas required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

D. No separate measurement nor payment will be made for compacting original ground and borrow materials required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

E. Quantities of excavation will be determined from the payment limits indicated and will be measured in their original positions by the cross section (average end area) method. Where such measurement is impractical, the volume will be measured by such other methods as the Engineer may determine, plus any additional excavation authorized in writing by the Engineer and not due to the Contractor's negligence nor for his convenience. Swelling will not be allowed in the computation of excavated quantities. Pay limits will be based on the existing ground as cross sectioned by the Contractor and approved by the Engineer as the upper limit and the payment lines shown on the Drawings as the lower and side limits.

5. Trench Excavation

a. General

1) The cost of excavation for drain lines, sewer pipes and water lines will be included in the price of the pipe placed.

b. Class A trench excavation will be measured as follows:

3) For test pit excavation and backfill at locations and limits as directed.

c. Class B trench excavation will be measured as follows:

1) No separate measurement nor payment will be made for Class B trench excavation, backfilling and compaction required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

4) No separate measurement nor payment will be made for sheeting required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

6. Materials excavated beyond, below or outside of the indicated pay limits and including necessary backfill will be at the Contractor's expense.

F. Quantities of pervious and impervious backfill and borrow materials from off site sources will be measured by the cubic yard compacted, complete in place. Measurement will be based on cross sections taken immediately prior to and after the placement and compaction of borrow material s as directed.

H. Re-excavation and rehandling of stockpiled material and reuse of any material excavated by the Contractor, whether or not stockpiled will not be separately measured for payment, but will be considered incidental to the earthwork to which it pertains.

I. No separate measurement nor payment will be made for survey for cross sectioning required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

J. No separate measurement nor payment will be made for capping/plugging abandoned pipes and conduits exposed by the excavation required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

K. No separate measurement nor payment will be made for waste materials disposed of off site required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

L. The excavation and replacement of disturbed subgrade outside the excavation limits and allowable limits shown on the Contract Drawings will not be measured for payment.

M. 3/4" washed crushed stone shall be measured by the cubic yard compacted in place.

4.02 PAYMENT

A. Payment for earthwork items and other related work required under this Section will be made at the Contract unit prices for the quantities determined as specified herein.

B. Test pits will be paid for at the Contract unit price under Item 0222.150, Trench Excavation - Class A, and the unit price will include the cost for restoring the test pit sites to their original condition.

C. 3/4" washed crushed stone will be paid for at the contract unit price for Item No. 0222.599, 3/4" WASHED CRUSHED STONE, which payment will be full compensation for all materials, tools, equipment, and other incidentals to and necessary for the completion of the work to the satisfaction of the Engineer.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0222.003	UNCLASSIFIED EXCAVATION	CY
0222.108	ROCK EXCAVATION	CY
0222.150	TRENCH EXCAVATION - CLASS A	CY
0222.504	GRAVEL BORROW	CY
0222.599	3/4" WASHED CRUSHED STONE	CY

END OF SECTION

SECTION 02290

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and removing of equipment and instrumentation for control of the system in accordance with Standard Specifications Construction Section 02290, except as modified herein. This Section also specifies the design, furnishing, installing and the removal of temporary sedimentation control system.

D. The Contractor shall also conform to Section 02081 Soil Management and Disposal.

E. The Contractor shall obtain permits required for proper discharge of groundwater and shall comply with all appropriate codes or permit requirements for any treatment of groundwater required prior to discharge.

F. The Contractor shall protect the existing tunnel drainage system from damage during construction and shall prevent untreated discharge from the Contractor's dewatering operations from entering the tunnel drainage system. Coordinate with the Authority for periodic inspections of the tunnel drainage system during construction. Repair any damage to the tunnel drainage system at no additional cost to the Authority.

1.02 DESIGN CRITERIA

A. The Contractor shall be responsible for the dewatering systems. The Contractor shall retain the services of a qualified registered professional engineer to design the dewatering systems.

1. Design the dewatering systems to:

   a. Achieve dewatering requirements specified herein for groundwater at design Elevation 110 (MBTA datum);

   b. Effectively reduce the hydrostatic pressure and lower the groundwater levels below excavation;

   c. Develop a substantially dry and stable subgrade for the prosecution of subsequent operations;

   d. Not result in damage to adjacent properties, buildings, structures, utilities and other work; and

e. Assure that after 12 hours of initial pumping, no soil particles will be present in the discharge.

B. Dewatering methods may include sump pumping, single or multiple stage well point system, eductor and ejector type systems, deep wells, grouting and combinations of two or more methods.

D. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, or to prevent further damage to said structures. The Contractor shall be responsible for determining the modifications to be made, which shall be at no additional cost to the Authority.

E. The Engineer will monitor piezometers and observation wells around the site to estimate the extent of drawdown, if any, outside of the site. This data will be made available to the Contractor. If excessive drawdown is detected, the Contractor shall modify the dewatering procedures.

F. Design, provide, operate, maintain, and remove a temporary surface water control system which will divert surface water away from excavations, geotechnical instrumentation, trenches, and other work areas.

G. Collect and dispose of discharge water from all systems in accordance with federal, state, and local codes, ordinances, and regulations. Obtain all necessary permits. Submit permits a minimum of 3 days prior to installation of the dewatering system. Submit 4 copies of permits.

H. Review of the Contractor's working drawings, design calculations, and methods of dewatering by the Engineer does not relieve the Contractor of responsibility for the adequacy of the dewatering system.

I. General

1. The methods of controlling groundwater both inside and outside the excavation are to be the option of the Contractor who shall be responsible for the location, arrangement, effectiveness, and depth of the system or systems selected to accomplish the work.

2. Effectively lower the water level and hydrostatic pressure in the soil in advance of excavation below the soil subgrades to be preserved.

3. Maintain groundwater levels as measured in observation wells immediately outside the excavation limits at all times during construction at an elevation not less than 3.0 feet lower than the water level measured in the observation wells prior to excavation at the site.

4. The taking of measures to achieve the required groundwater elevations will be assessed by the Engineer based on measured groundwater levels. However, it shall be the Contractor's responsibility to take all necessary measures to maintain the required levels.

5. Dewater excavation subgrades for the execution of subsequent construction operations so that construction operations are conducted in-the-dry.

6. During backfilling operations, maintain the water level a minimum of 2 feet below the top of backfill at all times during placement and compaction.

7. Take measures to prevent damage to properties, buildings, structures, sewers, and other utility installations, pavements, sidewalks, and other work. Prevent discharge of soil and loss of ground within or around the excavation.

8. Modify the system(s), at no additional cost to the Authority, if after installation and while in operation it causes, or threatens to cause, damage to existing buildings, structures, utilities, new construction or otherwise does not perform as required.

9. Repair damage, disruption, or interference to any facility resulting directly or indirectly from dewatering operations, at no additional cost to the Authority.

10. Locate dewatering system components where they will not interfere with construction activities adjacent to the work area or interfere with the installation and monitoring of geotechnical instrumentation. Excavations for sumps shall not be made within or below 2H:1V slopes extending downward and outward from edges of foundation elements.

11. Locate dewatering systems including, but not limited to, pumps, headers, well points, and associated equipment in such a manner so as not to interfere with adjacent construction contracts. If in the opinion of the Contractor such interference is unavoidable, the Contractor shall obtain permission from the Engineer prior to installing such equipment and coordinate the dewatering operations with the adjacent construction contracts.

12. Comply with federal, state, and local codes, ordinances, and regulations for disposal of discharge water and sediment control.

13. Maintain continuous and complete effectiveness of dewatering systems implemented to control groundwater seepage into excavations on a 24 hour basis, 7 days a week, at all times during construction.

14. Provide backup power generation and dewatering system components and devise emergency procedures for maintaining continuous, uninterrupted dewatering operations.

15. The Contractor may not connect to existing drains owned by the Authority, Boston Water and Sewer Commission (BWSC), or any other agency without obtaining permission in writing from the Owner of the drain system. Submit copy of letter to the Engineer.

16. The Contractor shall retain the services of a registered professional engineer to design the dewatering systems. The Contractor shall submit design drawings and design calculations. The design drawings and design calculations shall be prepared and stamped by a professional engineer registered in the Commonwealth of Massachusetts.

1.03 SUBMITTALS

C. Submit proposed method for abandonment of the dewatering system including a schedule that details the "phasing out" of the system with relationship to the new construction.

D. Submit details of temporary sedimentation control system.

E. Submit the following information at least 30 days prior to commencing excavation work:

1. Design drawings showing proposed types and details of surface water control and dewatering systems to be used. Include design calculations.

a Design drawings shall include the arrangements, locations, and depths of the proposed systems; a complete description of equipment and materials to be used and the procedure to be followed in installation, operation, and maintenance in relation to the proposed sequence of excavation, foundation construction, and backfilling; the standby equipment and standby power supply; and the proposed locations of points of discharge of water and their relationship to sediment control facilities.

b. Location and size of sumps, ditches, and water discharge lines including their relation to water disposal points.

2. Design calculations demonstrating the adequacy of the proposed systems and equipment.

3. Plan locations of proposed surface water control and discharge systems.

F. Submit revised dewatering systems design drawings and design calculations to indicate changes made to accommodate field conditions and to comply with design criteria. Submit revised design drawings and design calculations within 1 week after the completion of the revised dewatering system installation.

G. Submit copies of permits.

H. Submit records of dewatering operations as specified.

1.04 JOB CONDITIONS

B. Drainage of Excavated Areas. Provide and maintain ditches of adequate size to collect surface and seepage water which may enter the excavations. Divert the water into sumps and drain or pump into drainage channels or storm drains, subject to the approval of the BWSC. When water is to be diverted into a storm drain, provide settling basins or other accepted apparatus as required to reduce the amount of fine particles which may be carried into the drain. If a storm drain becomes blocked or its capacity restricted due to dewatering operations, make arrangements with the BWSC and clean the drain at no additional cost to the Authority.

C. The Contractor's attention is directed to the presence of layers of fine-grained granular materials encountered in the borings both above and below the station invert level. Excavations, particularly below the station base slab, shall consider impacts from potentially unstable materials below the groundwater level, and the Contractor shall provide satisfactory dewatering operations to stabilize those materials during such excavation.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Furnish, install, operate pumps, pipes, appliances and equipment of adequate capacity to keep the excavations free from water as necessary to complete the work. Maintain the equipment in proper operating conditions.

B. Crushed stone shall conform to Section 02200. Size of crushed stone used in dewatering work shall be at the option of the Contractor.

PART 3 – EXECUTION

3.01 DEWATERING

C. Maintain water levels at such levels required to prevent damage to existing and constructed facilities due to excessive hydrostatic pressures. As a minimum, the Contractor shall maintain the water level a minimum of 2 feet and a maximum of 5 feet below subgrade; unless otherwise permitted by the Engineer

D. Maintain a continuous and completely effective system throughout the conduct of the work.

E. The adequacy of dewatering efforts in and around the excavation will be determined by the Engineer on the basis of the stability of the bottom of the excavation. If there are indications of a hydraulic gradient causing piping, uncontrolled seepage or loss of ground, the Contractor may be required to increase the capacity of the dewatering system, to undertake a grouting program to control or limit seepage or to take other supplementary measures to reduce water pressures immediately adjacent to the excavation at no additional cost to the Authority.

F. Crushed stone shall be provided for the dewatering work as required by the Contractor, at no additional cost to the Authority.

G. Recharging of ground water will not be permitted

H. Repair damage to adjacent structures, utilities, and work resulting from operation of the Contractor's dewatering and surface water control system at no additional cost to the Authority.

I. Contractor shall remove all parts of the dewatering system and shall backfill or grout resulting voids to prevent loss of ground, as approved by the Engineer at the completion of the dewatering work.

3.02 RECORDS

A. Observe and record the average flow rate and time of operation of each pump used in the dewatering system. Where necessary provide appropriate devices, such as flow meters, for observing the flow rates. Submit the data, on a form furnished by the Contractor and approved by the Engineer, during the period that the dewatering system is in operation

3.03 PERFORMANCE MONITORING

A. Prior to start of site excavation, install the observation wells specified in Section 02010.

B. Demonstrate proper functioning of observation wells installed under Section 02010 prior to commencement of dewatering. Demonstrate in the presence of the Engineer that each instrument is functioning properly by adding or removing water and measuring rates of fall and rise of water level. Repair or replace instruments that are not functioning properly at no cost to the Authority.

C. During construction, the Engineer will periodically measure water levels in both existing and Contractor installed piezometers and observation wells. Water levels will be submitted to the Contractor and the Authority

3.04 TREATMENT

A. Water from dewatering operations shall be pumped to a temporary sediment trap; traps shall not be located in wetlands. Material collected by the sediment traps shall be removed daily, or as necessary. This material shall be removed from the site and disposed of in a legal manner.

B. The Contractor's methods of dewatering, excavating, and stockpiling soil materials shall include preventive measures to control silting and erosion and to intercept and filter any runoff of muddy waters.

C. Refer to Section 02081 Soil Management and Disposal for requirements associated with any contaminated groundwater encountered.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement nor payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item(s) of work to which they pertain.

- END OF SECTION -

SECTION 02295

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies designing, documenting, furnishing and installing temporary support systems for retained-cut excavations and tunnel modification work in accordance with Standard Specifications Section 02295, except as modified herein. This Section also specifies performance of a preconstruction survey and requirements for protection of structures.

D. Where indicated, remove temporary support system and when indicated provide and leave in place the excavation support system where shown on the Contractor approved Working Drawings.

E. Obtaining of any additional information necessary for the design, including, but not limited to, test borings and foundation plans, shall be the responsibility of the Contractor.

F. The Contractor's attention is directed to the Contract Drawings for information regarding subsurface conditions and design loading criteria.

G. The Contractor shall anticipate subsurface conditions including but not limited to brackish, tidal groundwater, ash and cinder fill, leakage from storm and sanitary sewers and other deleterious agents that are typically found in old urban areas. Fill and natural materials present at the site have been shown to contain cobbles and boulders of varying size including abandoned and existing foundations and walls. The Contractor's means and methods shall consider such conditions.

H. Related work specified elsewhere:

Section 02010 Geotechnical Instrumentation
Section 02050 Demolition
Section 02081 Soil Management and Disposal
Section 02200 Earthwork
Section 02290 Dewatering
Section 03100 Concrete Formwork
Section 03200 Concrete Reinforcement
Section 03300 Cast in Place Concrete
Section 03604 Non-Shrink Construction Grout
Section 05100 Structural Steel

1.02 DESIGN CRITERIA

B. Design the excavation support system to support the earth pressures, unrelieved hydrostatic pressures, Blue Line Railroad Loading, and AASHTO HS25 traffic loads if any, adjacent structure surcharge loads, utility loads, equipment and construction loads, and other

surcharge loads, as shown on the Contract Drawings. Excavation support shall allow the safe and expeditious construction of the permanent structures without excessive movement or settlement of the ground, to prevent damage to, or movement or settlement of adjacent buildings, tracks, structures, or utilities, as shown on the Contract Drawings and as specified herein.

F. Tiebacks will not be permitted.

G. Design calculations and shop drawings shall be prepared and stamped by a professional engineer registered in the Commonwealth of Massachusetts.

H. Review of the Contractor's plans, design calculations, and methods of construction by the Engineer does not relieve the Contractor of the responsibility for the safe and satisfactory performance of the earth support systems.

I. The system of support shall consist of soldier piles and lagging, secured in place by means of bracing members such as wales, cross-lot or raker bracing, or shores. Other methods of support may only be used when approved by the Engineer. Sheet piling is not considered suitable due to anticipated underground obstructions.

J. Soldier piles and lagging, or other approved systems shall be designed so that excavation can be completed in safety without unacceptable movement of adjacent ground or structures.

K. For temporary excavation support, the water table may be lowered to reduce the hydrostatic pressures in accordance with Section 02290.

1.03 SUBMITTALS

C. Submit preconstruction conditions report sealed by a Professional Engineer who is registered in the Commonwealth of Massachusetts consisting of the following:

1. Survey of existing structures, utilities and improvements.
2. Dated photographic documentation of existing structures and utilities and improvements.
3. Dated videotape documentation of existing structures utilities and improvements.

D. After checking locations of utilities by field investigations, revise drawings to show actual locations of facilities, location of excavation supports, interference with proposed work, and measures proposed to overcome such interferences.

E. Submit Track Monitoring Program.

F. Submit plan of actions to be implemented in the event any limiting deformations as specified herein or in Section 02010 are reached.

G. Submit Welder Qualifications in accordance with AWS D1.5.

H. Submit Weld Procedures in accordance with AWS D1.5.

I. Submit as-built drawings showing accurate and actual locations of excavation support systems left in place.

J. Submit certified mill reports for all structural steel.

K. Submit methods for dealing with obstructions.

1.04 QUALITY ASSURANCE

A. Adhere to the applicable requirements of the Standard Specifications, OSHA Standards and Interpretations: "Subpart P - Excavations, Trenching, and Shoring" and to all other applicable ordinances, codes, statutory rules and regulations of the federal, state and local authorities. Where conflicting criteria occur, the more stringent shall govern.

B. All calculations and Shop Drawings shall be stamped and sealed by a Professional Engineer registered in the Commonwealth of Massachusetts and specializing in geotechnical construction.

C. Excavation support shall be performed by personnel having demonstrated experience in the installation procedures recommended by manufacturers and as specified herein. All internal brace testing and prestressing shall be performed in the presence of the Engineer. Work completed without the Engineer being present will not be accepted.

1.05 JOB CONDITIONS

A. Provision for Contingencies

1. Monitor the performance of components of the excavation support system, both for vertical and for horizontal movement.

2. Implement contingency plans if deformations exceed specified values.

3. Have materials and equipment available to implement the approved contingency plan.

B. Proceed with caution in areas of utility facilities. Expose them by hand excavation or by other methods acceptable to the utility owner.

C. If existing utility facilities interfere with the proposed method of support, modify or relocate such facilities as required.

D. Since the support of excavation system will be installed through urban fill and glaciomarine deposits, the Contractor is forewarned that there will be numerous unknown obstructions encountered during the prosecution of the Work. The locations of these unknown obstructions may not be indicated in the Contract Documents, however they are to be anticipated. The Contractor's attention is directed to information presented on the 1923 station design and as-built drawings which show the location of the original 1903 tunnel and numerous other structures that have since been demolished. The design of the excavation support systems shall consider potential underground obstructions from abandoned foundations and other structures, and shall, to the extent possible, be located to avoid such obstructions.

E. At some locations, the support of excavation will be installed above existing tunnel structures. Installation of the excavation support system shall protect the existing tunnel structures, including any waterproofing system, from damage. Where possible, the support of excavation system shall be located to avoid existing tunnel structures.

PART 2 - PRODUCTS

2.01 MATERIALS

F. Soldier H-piles, bracing, wales, anchors and fasteners shall conform to Section 05100.

G. Timber lagging shall conform to the following requirements:

1. Moisture content shall not exceed 19%.

2. Use sound, well-seasoned timber such as Douglas Fir, Southern Pine or Cedar.

H. Grout: Comply with the pertinent materials specifications of Section 03604, Non-Shrink Construction Grout.

I. Cast-in-Place Concrete shall comply with the requirements of Section 03300.

PART 3 - EXECUTION

3.03 PRECONSTRUCTION SURVEY

A. A condition inspection survey of all structures, including tracks and utilities within the zone of influence of construction as defined on the Contract Drawings, shall be performed by the Contractor. These surveys shall be performed before the construction commences and after the construction is complete to the satisfaction of the Engineer. These surveys will document the existing exterior condition of each structure with diagrams, videotapes, sketches, descriptive text and dated photographs as necessary to document conditions existing prior to and after the construction. In addition, a level survey shall be performed for each building structure. This level survey shall include elevations of building entrances, basements and first floors, with descriptions noted on the drawing of a building. The level survey shall also be performed before and after the construction.

The initial condition survey shall be performed prior to the start of construction work at the site. Upon completion of construction, a final condition survey, using the same procedure as for the initial condition survey, shall again be undertaken to identify any changes in the condition of the structures since the initial survey. The results of these surveys shall be summarized in a formal report or reports prepared by the Contractor and signed by each member of the group. Five copies of each report shall be submitted to the Engineer, who will forward one copy to the Property Owner. Should any damage or change occur to the structures during construction, additional surveys of the structures shall be conducted as necessary, or as directed by the Engineer, at no additional cost to the Authority. The Contractor shall notify the Property Owners a minimum two months prior to the proposed date of the structure condition survey for coordination purposes.

B. Where applicable, these records should include, but are not limited to, length and width of existing cracks, number of cracks, locations of water marks, conditions of door and window jambs, condition of paint, condition of masonry, and any other features appropriate to the structure being surveyed. The surveys shall be conducted with representatives of the owner of the structure, Contractor, and Engineer present.

C. Survey adjacent structures, utilities and improvements, establishing exact elevation and locations at fixed points as shown on the Drawings.

D. During excavation work, maintain accurate log of surveyed elevations and locations for comparison with pre-construction elevations and locations. The Contractor shall promptly notify the Engineer if changes in elevations and locations occur or if cracks, sags or other damage is evident.

3.04 CONSTRUCTION MONITORING

A. Monitor the performance of the system, including horizontal and vertical movement and groundwater levels and pore pressures in accordance with Section 02010. In the event measured wall movements approach or exceed the criteria specified, the Contractor shall take immediate steps to arrest further movement by revising his procedures, providing supplementary bracing or other measures, as required, at no additional cost to the Authority.

B. Comply fully with the Engineer in providing safe access to instrument locations, maintaining locations from damage.

3.05 SUPPORT OF EXCAVATIONS ADJACENT TO RAILROAD OR TRANSIT TRACKS

A. Provide excavation support systems adjacent to tracks when limits of excavation encroach upon a slope of 1.5 horizontal to 1.0 vertical downward measured from the end of any track tie supporting operations service rails. The following items are to be included in the design and construction procedures for all permanent and temporary facilities adjacent to tracks:

1. During construction any temporary excavation support installed for support of track or tracks adjacent to footing for piers, columns, walls or other facilities shall be located no closer than toe of ballast slope. (See dimensions on MBTA standard plans for tangent and curved track.)

2. When support of track or tracks is necessary during construction of above mentioned facilities, provide interlocking soldier pile and lagging or other approved systems, adequately braced and designed to carry Blue Line live loading as appropriate and as shown on the Contract Drawings.

3. Prior to placing excavation support systems, exploratory trenches, three feet deep and fifteen inches wide in the form of an "H" with outside dimensions matching the outside of support of excavation system dimensions, shall be hand dug in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately after the exploratory work is finished. This work shall be done in the presence of an MBTA inspector.

4. The Contractor shall coordinate installation of excavation support adjacent to active railroad tracks with MBTA. The procedure for arranging for use of track shall be acceptable to the Engineer.

5. Cavities created by installation of excavation support systems shall be filled with sand and any disturbed ballast shall be restored and tamped immediately.

6. During construction, excavation support systems shall be cut off at the elevation of the top of adjacent tie. After construction and backfilling has been completed, the piling within twelve feet or less from centerline of track, or piling with the bottom of adjacent excavation below the intersection of a line extending at 1:1 slope from end

of tie and excavation support, shall be cut off eighteen inches below existing ground line or twenty-four inches below the bottom of tie, whichever is greatest, and left in place.

7. Excavation adjacent to the track shall be covered, ramped, and protected by handrails, barricades, and warning lights all provided by Contractor as directed by the Engineer.

8. Final backfilling of excavation shall be as required by Section 02200.

9. Drawings for all temporary excavation support shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall be accompanied by complete design computations when submitted for approval.

10. Where physical conditions of design impose insurmountable restrictions requiring the placing of excavation support closer than specified above, the proposed exceptional conditions shall be submitted to the Engineer for approval of any modifications.

11. Particular care shall be taken to avoid erosion or filling of track drainage facilities. Erosion and sediment control in the vicinity of the track shall be as approved by the Engineer. Correction of disrupted track drainage facilities shall be at the Contractor's sole expense.

B. All temporary supports located within five feet of the end of track tie shall be left in place unless otherwise directed by the Engineer.

C. The Contractor is hereby warned that vibrations from construction activities such as installing excavation support systems may cause settlement to existing ground and adjacent tracks. The Contractor shall take all necessary steps to minimize vibrations and protect tracks as specified herein.

3.06 PRE-EXCAVATION

A. Pre-excavate to depths up to 5 feet to remove obstructions for installation of excavation support system. Support the excavation sides in accordance with Paragraph 1.04.A. Backfill the excavated area with granular material or flowable fill

3.07 REQUIREMENTS FOR SOLDIER PILES AND LAGGING

A. Construct soldier piles by pre-boring methods properly aligned and vertical. Pre-bore holes for the entire length of the soldier piles to a diameter at least 4 inches larger than the maximum diagonal dimension of the pile sections. Unless otherwise approved by the Engineer, the installed soldier pile shall be within the following tolerances from the location shown on the Working Drawings: 3 inches perpendicular and 12 inches parallel to the plane of the wall. A maximum of 1% out of plumb will be allowed provided that outside minimum excavation line is maintained. Correct misaligned soldier piles. Soldier piles shall not be driven.

B. Pile tips shall be installed to proper embedment elevations shown on approved Working Drawings. Backfill any pre-formed holes with structural concrete by tremie methods to base of the excavation. Place lean concrete by tremie methods in the remainder of the hole to the surface of existing ground.

C. Remove lean concrete from pile as excavation progresses sufficient to place lagging. Follow the excavation closely with placement of lagging. The maximum height of excavated face above water table shall not exceed 4 feet prior to installation of lagging. Excavation below ground is not permitted.

D. Use timber lagging, or steel sheeting secured in place to soldier piles, or installed behind flanges as shown on the approved Drawings.

E. Carefully perform excavation for the installation of lagging in order to minimize the formation of voids. As the installation progresses, backpack the voids between the excavation face and the lagging with sand-pack to establish a tight contact. Pack openings between lagging with hay, engineered filter fabric or other porous material to allow free draining for water without loss of retained soil or sand-pack, or use prefabricated drainage panel. Follow the excavation closely with lagging placement.

F. If unstable material is encountered during excavation, the maximum unlagged height of excavation shall be 2 feet and additional suitable measures to stabilize the soil and prevent ground displacement acceptable to the Engineer, shall be undertaken.

G. Maintain a sufficient quantity of material on hand for lagging, bracing, and other operations for protection of the Work and for use in case of an accident or an emergency.

H. If water is flowing from the face of the excavation, or if soil to be retained moves toward the excavation, reduce the height of unlagged face.

I. If unstable ground is encountered, take suitable measures to retain the material in place and prevent loss of ground and/or movements that may cause damage to adjacent buildings, structures or utilities.

J. If voids develop behind the lagging at any time the system is in use, backfill these voids with lean concrete or grout.

3.08 REQUIREMENTS FOR BRACED EXCAVATIONS

A. Install and maintain primary support members in tight contact with each other and with the surface being supported. Use wales, struts, and rakers to provide braced support of soil excavations. Design the primary support bracing for the maximum loads to be encountered during each of the excavation or removal stages.

B. Preload primary bracing members to 50% of the design loads, and in accordance with procedures and sequence as described on the Working Drawings. Transfer load by jacking applied systematically to braces without introducing eccentricity. Coordinate excavation work with the installation of bracing and preloading. Use steel shims and steel wedges welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment force. Wood blocking is not acceptable. All preloading shall be performed in the presence of the Engineer.

C. Install cross lot bracing (struts) only between sides of an excavation supported with components of similar rigidity.

D. Provide internal bracing with intermediate vertical and horizontal supports as required for weak-axis or unbraced length criteria. Provide diagonal bracing where needed for stability of earth support systems. Arrange wales, struts, posts, and braces in such manner as will

minimize interference with construction of permanent structures and compaction of the backfill. Include web stiffeners, plates or angles as needed to prevent rotation, crippling or buckling of connections at points of bearing between structural steel members. Allow for eccentricities due to field fabrication and assembly.

3.09 OBSTRUCTIONS

A. The support of excavation system will be installed in urban fill and glaciomarine deposits that are known to contain obstructions that may affect installation. The Contractor shall anticipate and employ suitable methods to penetrate any obstructions encountered, including but not limited to boulders, bricks, demolition and construction debris, abandoned utilities and pipes, and old buried structures such as foundations and tunnels. Obstructions are defined as man-made or man-placed objects, materials, or structures, or naturally occurring boulders, at depths greater than 5 feet below the ground surface, which unavoidably and completely stop the progress of the support of excavation installation Work for more than 30 minutes, despite the Contractor's diligent efforts, as determined by the Engineer. The Contractor shall be prepared to perform obstruction drilling using drop chisels, core barrels, impact hammers or rock breakers, rock augers or similar methods to advance the hole. Payment for obstruction drilling shall be as specified in Paragraph 4.02.

B. The Contractor shall notify the Engineer, immediately upon encountering any obstruction that unavoidably and completely stops the progress of the Work, despite the Contractor's diligent efforts. That Contractor notification may be verbal, but if verbal, shall also be confirmed by the Contractor in writing within 24 hours. That notification shall include all pertinent information relating to the nature, depth, plan location coordinates, expected extent of the obstruction, and methods the Contractor intends to use to overcome the obstruction.

C. If possible, re-locate the excavation support system to avoid the encountered obstruction. Otherwise remove obstructions by the most diligent practical means complying with noise and vibration limitations and other specified requirements. Maintain excavation support and protection of nearby structures and utilities at all time.

3.10 MAINTENANCE OF SOIL SUPPORTS

A. Repairs of wood surfaces - apply brush coat of fire retardant and wood preservative to surfaces exposed by sawing, cutting or drilling.

B. Maintain a sufficient quantity of materials on hand throughout the conduct of work for lagging and bracing and other operations for protection of the work and for use in case of accident or emergency.

C. Seal leaks uncovered in the walls as excavation progress.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Temporary Excavation Support Systems will be paid for on a lump sum basis.

B. Preconstruction Survey will be paid for on a lump sum basis.

C. Payment for removal of obstructions during installation of excavation support systems will be measured as the time the Contractor diligently spent trying to remove the obstruction from the time it was encountered until its removal, less an initial 30 minute period. Measurement for the removal of obstructions encountered during installation of excavation support shall be made only if progress was unavoidably and completely stopped due to an obstruction, despite diligent efforts by the Contractor to progress the Work for at least 30 minutes, and only after a direction to proceed under the obstruction pay item is provided by the Engineer.

D. No separate measurement for payment shall be made for any obstruction which can be removed in less than 30 minutes, or which is present at a depth of less than 5 feet below the ground surface shown on the Drawings. The Contractor agrees that it has included any and all costs of any Work associated with breaking out obstructions which can be removed in less than 30 minutes or at a depth less than 5 feet, including, but not limited to, all indirect impacts, time and idle time, as well as the risk of bearing such costs, in the related payment items, whether Lump Sum or Unit Price. The Contractor shall submit no claim for this time and/or cost incurred in spite of the fact that the number of such occurrences and the Work to be performed in that time may not be determinable or calculable.

E. No separate measurement for payment shall be made for removal of spoil from soldier pile or other excavations necessary for installation of excavation support systems. The cost of such work shall be included in the item to which it pertains.

F. No separate measurement and payment will be made for the support of excavation required for the expansion of Unit Substation B2 but all costs shall be included in the lump sum pay item 0222.000, Excavate and Backfill specified in Section 02200.

4.02 PAYMENT

A. The cost for providing Temporary Excavation Support shall include in the lump sum price the cost of design, construction, and removing or leaving in place as appropriate, monitoring the performance of the system, and furnishing all labor, materials, equipment and incidentals necessary to satisfactorily complete the work.

B. The cost for conducting the Preconstruction Survey shall include in the lump sum price the cost of documenting the existing exterior condition of each structure with diagrams, videotapes, sketches, and dated photographs as necessary to document conditions existing prior to construction.

C. Removal of obstructions shall be paid for at the Contract unit rate per hour for Obstruction Removal. The payment item shall include all costs for; 1) breaking down and removing obstructions, and any associated stockpiling, handling, dumping, and reloading prior to removal from site for disposal; 2) associated idle time, activation and deactivation of additional labor and equipment; 3) idle time and resequencing for any crew that may become

temporarily inactive, moved and/or discontinuous when the obstruction is encountered and removed; 4) any and all resequencing of the Work; 5) any and all delay and inefficiencies; and 6) indirect and any and all other costs.

Payment Item No.	Description	Unit
0214.110	TEMPORARY EXCAVATION SUPPORT SYSTEMS	LS
0212.800	PRECONSTRUCTION SURVEYS	LS
0250.006	OBSTRUCTION REMOVAL	HR

- END OF SECTION -

SECTION 02296

TRAFFIC DECKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies designing, furnishing, installing, maintaining and removing decking of streets and sidewalks required for maintenance of traffic over excavated areas, including surface members and those supporting members upon which they directly rest, in accordance with Standard Specifications Construction Section 02296, except as modified herein.

1.02 DESIGN CRITERIA

A. Design for AASHTO HS25 surface loading, indicated earth pressures, utility loads and other applicable live and dead loads, including construction equipment.

1.03 WORKING DRAWINGS

D. Submitted drawings and calculations shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement nor payment will be made for work required under this Section, complete in place. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

SECTION 02400

DRAINAGE AND SEWER SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies construction of drainage facilities and sanitary sewer facilities in accordance with Standard Specification Section 02400, except as modified herein.

B. The construction of storm drainage and sanitary sewer facilities shall conform to the requirements of the Boston Water and Sewer Commission (BW&SC) Standard Details and Specifications, and the special details indicated on the Contract Documents.

C. The Contractor shall notify BW&SC in writing at least two (2) weeks prior to starting any work on sanitary sewer and storm drainage facilities of the BW&SC, or to be constructed for use by the BW&SC. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. Coordinate all aspects of the sanitary sewer and storm drainage work with:

Mr. Stephan Shea, P.E.
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7425

Mr. Philip E. Larocque, P.E.
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7205

D. The Contractor shall be responsible for obtaining all BW&SC standard details and specifications specified in these specifications.

1.02 LEAKAGE TOLERANCES

A. Gravity Lines. Maximum allowable leakage for any section or sections, or for the total length of pipe lines: 100 gallons per inch of diameter per mile per 24 hours for storm drains, and 25 gallons per inch of diameter per mile per 24 hours for sanitary sewers.

1.03 SUBMITTALS

B. Manufacturer's technical data, brochures, catalog cuts, samples and installation instructions of the following:

1. Pipes and fittings
2. Joint materials
3. Mortar
4. Precast concrete manholes and catch basins
5. Frame and grate or cover, steps, pvc tees and hoods
6. Bricks

7. Coatings

8. Synthetic rubber sleeves

C. Certificate of Compliance for pipes, manholes and catch basins.

D. Plans of temporary diversion of storm drainage and sanitary sewer flows.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02650 Existing Site Utilities

F. Section 02651 Electric Facilities Relocation

G. Section 02652 Gas Facilities Relocation

H. Section 02653 Telephone Facilities Relocation

I. Section 02654 Fire Alarm Facilities Relocation

J. Section 02713 Exterior Water Distribution Systems

K. Section 02800 Exterior Conduit Systems

L. Section 03100 Concrete Formwork

M. Section 03200 Concrete Reinforcement

N. Section 03310 Portland Cement Concrete

O. Section 03400 Precast Concrete

P. Section 04200 Unit Masonry

Q. Section 05500 Miscellaneous Metal

R. Section 05920 Corrosion Control

S. Section 07101 Waterproofing and Dampproofing

T. Section 15050 Basic Materials and Methods for Mechanical Work

1.05 INSPECTION

A. The work required under this Section shall be subject to the inspection of the BW&SC and the Engineer.

1.06 JOB SITE CONDITIONS

A. Make such provisions as may be required by Federal, State, local offices, agencies and/or commissions with jurisdiction over the flows of storm drains and sanitary sewers during construction.

B. At all times, all reasonable measures shall be taken to insure that debris and any material other than water does not enter into the storm drainage system.

1.07 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.08 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.09 BW&SC ALLOWANCE

A. The BW&SC responsibilities included in the allowance are the following:

1. Supply all labor and equipment for inspection of all construction by the Contractor relating to BW&SC facilities.

B. The Contractor's responsibility, not included in BW&SC's allowance, is to supply all labor, equipment and materials for:

1. The installation of all of the MBTA's and BW&SC's sanitary sewer and storm drainage systems.

2. Coordination with the BW&SC.

1.10 AS-BUILT PLANS

A. Upon completion of the work, the Contractor shall submit to the Boston Water and Sewer Commission as-built Mylar drawings and an AutoCAD release 14 disk of the entire sanitary sewer, storm drain and water main work performed by the Contractor. These drawings must include:

1. Locations of any and all abandoned items, such as pipes, water gates and manholes.

2. Locations of all new installations, such as gates, manholes, reducers, 3-way tees, bends and other appurtenances.

3. Tie-in measurements from all new items to property lines and corners.

4. Profile of all sewer and drain lines. Invert elevations of all sanitary sewer and storm drain lines at the manholes.

5. Depth of water pipe at all gates, bends and connections.

6. Size and type of all pipes, valves and hydrants installed.

7. Rim elevations of all manholes.

PART 2 – PRODUCTS

2.01 GENERAL

B. All sanitary sewer and storm drain materials shall conform to the BW&SC standards, details and specifications.

2.02 PIPE AND FITTINGS

C. Reinforced concrete pipe (RCP), unless otherwise directed, shall conform to the requirements of ASTM C 76, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, latest edition, Class IV or V. Wall thickness shall be "B". Packerhead type process shall not be used.

D. Joints and Gaskets for Circular Concrete Pipe: ASTM C443, latest edition.

H. Polyvinylchloride (PVC) Sewer Pipe and Fittings:

1. Six inches to 15 inches: ASTM D3034, latest edition.

2. 18 inches and larger: ASTM F679, latest edition.

3. All PVC pipe shall have a pipe diameter to wall thickness ratio (SDR) of a maximum of 35.

I. Wyes and chimneys for service connections shall be in accordance with BW&SC standards, details and specifications.

J. Ductile iron gravity sewer pipe, unless otherwise directed, shall conform to the requirements of ASTM A 746, Ductile Iron Gravity Sewer Pipe, latest edition, Class 52. The pipe shall have a double thickness cement mortar lining conforming to the requirements of AWWA C104, latest edition.

K. The force main shall be ductile iron conforming to ANSI/AWWA C151/A21.51, latest edition, thickness class 52, double thickness cement mortar lined, with mechanical joints. Fittings shall be ductile iron conforming to ANSI/AWWA C110/A21.10, latest edition, pressure rating 350 psi, double thickness cement mortar lined, with mechanical joints.

2.05 DRAINAGE AND SEWER STRUCTURES

C. All items shall conform to the BW&SC standards, details and specifications.

D. Measurement for all sanitary sewer and storm drain manholes will be based on a depth as measured vertically at the center of the structure from the top of the cover to the lowest manhole invert.

2.09 BEDDING AND BACKFILL

A. Bedding and backfill materials shall conform to the BW&SC standards, details and specifications.

B. Screened gravel for pipe and structures shall be as specified in Standard Specification Section 02200.

2.10 MANHOLE STEPS

A. Manhole steps for work specified in this Section shall conform to the requirements shown on the BW&SC standards, details and specifications.

2.11 COATINGS

A. All storm drainage and sanitary sewer structures in contact with the earth shall be exterior coated and the coating shall be in conformance with the BW&SC specifications.

PART 3 – EXECUTION

3.01 GENERAL

B. Bedding. Construct bedding as indicated on the BW&SC standards, details and specifications.

E. Protection

4. Protect existing sanitary sewer and storm drainage lines and structures in and through the construction area until final acceptance of the new work.

5. When work is not in progress, open ends of piping shall be securely closed to prevent substances from entering the pipe.

6. Protect all bases of excavation from frost. Base or bedding material shall not be placed on frozen ground.

7. Protect all precast concrete units from damage. All precast concrete units shall be inspected by the Engineer for defects before placing. Defective products shall be replaced.

8. All joint surfaces shall be kept free from any defects or materials that could impair proper jointing.

9. Protect existing catch basins from silting. Those in need of cleaning due to Contractor's operations shall be cleaned as directed by the Engineer and/or BW&SC. The Contractor shall obtain approval from the Engineer as to the type of machinery and method of cleaning to be used.

10. When proposed and/or existing sanitary sewer lines cross over proposed and/or existing water mains, the sanitary sewer line shall be encased in 3,000 psi, 1-1/2 inch aggregate concrete for a length of ten feet in both directions from the center line of the water main in accordance with the BW&SC standards, details and specifications.

G. It shall be the Contractor's responsibility to maintain existing sanitary sewer and storm drainage flows on and through the construction area until final acceptance of all new work covered by the Contract.

H. It shall be the Contractor's responsibility to locate all existing storm drain and sanitary sewer service connections affected by the new construction. The Contractor shall install new service connections as directed by the Engineer and the BW&SC.

I. At the completion of the work of the sanitary sewer and storm drainage systems, the Contractor shall flush and clean all new pipes and structures at no additional cost to the Authority.

J. It shall be the Contractor's responsibility to locate all existing storm drain service connections affected by the new construction. The Contractor shall install new storm drain service connections as indicated on the contract drawings, as directed by the Engineer and the BW&SC, and as stated in these specifications.

3.05 INSTALLATION OF REINFORCED CONCRETE PIPE

C. Each pipe section shall be installed true to line and grade and in a manner to form a close concentric joint with adjoining sections. Offsets in the flow line shall be cause for rejection. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow.

D. Surfaces of pipes and fittings shall be protected from damage and kept free from dirt and other foreign materials at all times.

E. Bottoms of trenches shall be shaped to provide substantially uniform circumferential support to the full length of each pipe.

F. Field cutting of pipe shall be performed by qualified workmen using mechanical cutters or as otherwise recommended by the manufacturer. Irregularly cut pipe will not be accepted.

3.07 BACKFILL

B. Compact the trench backfill and bedding in six-inch layers to 95 percent maximum dry density as obtained in accordance with ASTM D2922 Nuclear Method, latest edition. Each eight-inch layer shall be compacted and tested before the next layer shall be placed.

3.08 TESTING

A. The testing of all sanitary sewer and storm drainage systems for tightness shall be accomplished in the presence of the Engineer and the BW&SC. Advise the Engineer in writing seven days in advance of any testing. If the pipeline and/or manhole fail to satisfy the requirements of any test method the source of the defect shall be determined, repair defective materials and workmanship and a retest shall be accomplished. Submit all test results to the Engineer to be retained as part of the permanent records.

C. Storm Drainage System

1. Alignment Test: After the backfill has been placed and compacted to a depth of one foot above the top of the pipe make a visual inspection by flashing a light between manholes. Uncover and repair any displacement or misalignment of invert and correct before backfilling is continued.

2. Manhole Test: Plug all inlets and outlets. Fill manhole to four feet above the highest invert or known ground water elevation, whichever is higher. Let water stand in manhole for one hour than refill to the four-foot height. After one hour record the drop in elevation of the water surface and convert to gallons per day lost through manhole leakage. The manhole leakage shall not exceed one gallon per vertical foot for a 24-hour period. If the test fails this requirement, repairs by Engineer approved methods shall be made to bring the leakage within the allowable rate and the test retaken. Continue such tests until the manhole is accepted.

3. Exfiltration Test Method:

a. Perform the exfiltration test of the pipeline sections between consecutive manholes or at points of connection if there are no manholes.

b. Plug the downstream pipe outlet in a manner that ensures a tight seal against any water leakage.

c. At the upstream manhole or connection, fill the section of pipeline to be tested with water to a height of two feet above the top of the pipe or known ground water elevation, whichever is higher.

d. Allow the water to stand for not less than eight hours. After the pipe has become saturated, refill the pipeline to the established measuring mark and begin the test. Allow the pipeline to remain filled for a period of 72 hours. Measure the final water elevation and convert the difference in the initial and final elevations to gallons. Exfiltration shall be that volume of water calculated from the difference in elevations during the 72-hour period.

e. If the leakage exceeds the permissible loss, the pipeline section will not be accepted. For failing pipeline sections, repeat the test after corrective measures have been completed and continue such tests until the pipeline section is accepted.

D. Sanitary Sewer System

1. Alignment Test: Same as 3.08 C. 1.

2. Manhole Test: Same as 3.08 C. 2.

3. Air Test: UNI-BELL Recommended Standards and Practices; UNI-B-6 Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.

a. The Engineer and the BW&SC will witness all low-pressure air tests and verify the accuracy and acceptability of the equipment utilized. The Contractor shall record all the pertinent data and test results and submit the results to the Engineer as part of the permanent records.

b. If the installation fails to meet the requirements specified, determine the source of the leakage and repair or replace all defective materials or workmanship and repeat the test until all requirements are met.

3.09 CONSTRUCTION OF STORM DRAINAGE AND SANITARY SEWER STRUCTURES

A. Construct catch basins and manholes in accordance with the BW&SC standards, details and specifications.

B. Catch basins and manholes shall be laid on firm bearing material and in accordance with the lines and grades indicated.

C. Frame castings shall be set in full cement mortar beds true to the lines and grades as directed. Concrete collars shall be used around all castings.

D. Brick masonry shall not be laid after the atmospheric temperature has fallen to 32 degrees F.

E. All sanitary sewer and storm drain manholes shall have a sleeve of high quality synthetic rubber terminating in a substantial flange of the same material at all points of pipe entry and exit. The flange shall be serrated and cast into the wall of the manhole to form a tight water stop. The sleeve shall protrude at right angles to the wall. The synthetic rubber shall have a tensile strength of 1500 psi and be resistant to raw sewerage, ozone acids, weathering and steam. It shall remain flexible at temperatures ranging from minus 60 degrees F to plus 300 degrees F. The sleeve shall be secure to the pipe with a stainless steel clamp, draw bolt and nut.

F. All precast concrete manholes and catch basins shall be coated on the outside per the manufacturer's recommendations with two coats of a coal tar epoxy protective coating conforming to the Corps of Engineers Specification C-200 and Government Specification MIL-P- 23236, latest editions.

G. All sanitary sewer manholes shall have their inverts paved in brick and the storm drain manholes shall have cement concrete inverts.

H. The Contractor shall submit temporary diversion procedures of the existing sanitary sewers and/or storm drains to the Engineer for approval.

I. Reinforced concrete slab tops will not be used in lieu of the tapered section.

3.10 SERVICE CONNECTIONS

A. Pipe for service connections shall be laid at not less than two percent grade for sanitary sewers and one percent grade for storm drains.

3.11 INSTALLATION OF PVC PIPE

A. PVC pipe shall be installed in conformance with BW&SC Standard Drawing Number B-09, ISO/TR 7073, UNI-PUB-6 and in accordance with the details indicated on the contract documents.

3.12 ABANDONING EXISTING STORM DRAINS AND SANITARY SEWERS

A. All abandonment of existing storm drains and sanitary sewers must be cut and capped off at the primary main(s) in the street.

3.13 INSTALLATION OF DUCTILE IRON FORCE MAIN

A. Install the ductile iron force main pipe and fittings in accordance with AWWA C600, latest edition.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

B. Storm drainage and sanitary sewer structures will be measured per each for each type, size and depth built, complete in place, except for the following:

1. Frame and grate or cover will be separately measured per each installed, regardless of type and size, complete in place.

2. Catch basins will be separately measured per each regardless of type, size and depth, including hoods or tees, complete in place.

C. Items including: pipe fittings; joints; protective coatings; pipe bedding unless it is a borrow material; screened gravel; cutting of pipe; steps; testing; excavation, backfill, compaction and disposal of excess excavated materials; dewatering; support of excavation; manhole and inlet bases; synthetic rubber sleeves; flexible couplings; temporary and permanent patches; concrete and concrete reinforcement for sanitary sewer and storm drainage structures; concrete collars; catch basin signs; hoods and tees; cutting and capping/plugging abandoned sanitary sewer and storm drain pipes/lines; supporting and protecting existing facilities including sanitary sewer and storm drainage systems; restoring facilities destroyed or damaged during construction; testing of sanitary sewer and storm drainage facilities; will not be separately measured for payment and all costs in connection therewith will be considered incidental to the item of work to which they pertain.

D. Concrete and concrete reinforcement for encasement and cradle will not be separately measured for payment but all costs of which shall be included as part of the Contract unit prices for the items to which they pertain.

E. Extra depth excavation below the proposed bottom of a structure to obtain a stable foundation will measured and paid for as specified in Standard Specification Section 02200.

F. Backfill and bedding materials specified as borrow will be measured and paid for as specified in Standard Specification Section 02200.

G. Rock excavation will be measured and paid for as specified in Standard Specification Section 02200.

H. Temporary diversions of existing sanitary sewers and storm drains will not be separately measured for payment but all costs in connection therewith shall be included as part of the Contract unit prices for the various payment items in this Section.

I. Wyes and chimneys for service connections will not be separately measured for payment but all costs in connection therewith shall be included as part of the Contract unit prices for the pipes installed.

J. Service connections will be measured and paid for as individual pipe item used, complete in place.

K. The Mylar as built drawings and AutoCAD release 14 disk submitted to the Boston Water and Sewer Commission will not be separately measured for payment but all costs of which shall be included as part of the Contract unit prices for the items to which they pertain.

L. No separate measurement or payment will be made for demolishing and removing abandoned utility facilities in conflict with the work. All costs in connection therewith will be considered incidental to the item/items of work to which they pertain.

M. Ductile iron pipe and fittings will be measured by the linear foot for each type and size, along the centerline.

N. PVC pipe and fittings will be measured by the linear foot for each type and size, along the centerline.

4.02 PAYMENT

A. Pipes will be paid for at the Contract unit prices per linear foot for each type for the quantities determined as specified above.

B. Sanitary sewer and storm drainage structures will be paid for at the Contract unit price per each type, size and depth for the quantities determined as specified above.

C. Frames and grates or covers will be paid for at the Contract unit price per each, regardless of type and size for the quantities determined as specified above.

D. Force main ductile iron pipe and fittings will be paid for under Item 0251.770, 8" Ductile Iron Pipe.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0211.463	BOSTON WATER AND SEWER COMMISSION UTILITIES	AL
0250.102	CATCH BASINS ECC MUNICIPAL STANDARD	EA
0251.588	10" PVC PIPE	LF
0251.768	6" DUCTLE IRON PIPE	LF
0251.770	8" DUCTILE IRON PIPE	LF
0251.776	16" DUCTILE IRON PIPE	LF
0255.077	FRAME AND GRATE OR COVER – MUNICIPAL STANDARD	EA
0255.089	DROP INLET-ECC	EA
0255.096	DRAIN MANHOLE ECC MUNICIPAL STANDARD	EA
0255.097	DRAIN MANHOLE ECC (9' TO 14' DEPTH)	EA
0255.196	SANITARY SEWER MANHOLE ECC MUNICIPAL STANDARD	EA

0348.412	12" REINFORCED CONCRETE PIPE CLASS IV	LF
0348.415	15" REINFORCED CONCRETE PIPE CLASS IV	LF
0348.418	18" REINFORCED CONCRETE PIPE CLASS IV	LF
0348.424	24" REINFORCED CONCRETE PIPE CLASS IV	LF

END OF SECTION

SECTION 02444

CHAIN-LINK FENCE AND GATES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and chain-link fencing work, in accordance with Standard Specifications Construction Section 02444, except as modified herein.

B. Work includes furnishing and installing all chain-link fencing and gate work as part of temporary security fences; temporary fences around Contractor staging areas; temporary pedestrian walkways, and elsewhere as indicated, required, or as directed by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement and payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

-END OF SECTION-

SECTION 02450

TRASH RECEPTACLE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to locate and install trash receptacles and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02520 – Granite Paving.
3. Section 02524 – Curbs, Gutters and Walks
4. Section 02525 – Color Imprinted Concrete Pavement.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Contractor shall submit product literature and coordinated Shop Drawings, which shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and

supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature for bench and trash receptacle so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and product literature.

C. Sample Mock-up: Contractor shall provide a sample mock-up of the trash receptacle, complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained for the trash receptacle.
2. The approved sample shall become the standard for the entire job. The sample can be constructed at a location that will become part of the work and if approved, the sample shall become part of the final work.
3. Obtain Engineer 's written acceptance of the sample before proceeding with the final work.
4. Schedule sample so that sample can be accepted a minimum of 30 days prior to installation represented by the sample.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of benches and trash receptacles shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 TRASH RECEPTACLE

A. Trash receptacle shall be Model S-42 with S-2 spun steel dome as outlined below, and as manufactured by Victor Stanley, Inc., Dunkirk, Maryland, (800) 368-2573 or approved

equal in design, dimensional size, and factory finish as manufactured by DuMor Site Furnishings local distributor O'Brien & Sons (800) 835-0056 or American Site Furnishing Concord, MA. (800) 366-3080. Finish shall be factory applied polyester powder-coat, color black or as selected by Engineer from manufacturer's standard color range. All coatings shall be lead free.

B. Receptacle shall include 36 gallon N-PL36 high density molded linear polyethylene plastic liner, and four adjustable glide with 3/8 " diameter threaded steel shaft leveling legs.

C. All hardware shall be stainless steel conforming to AISI Type 304 and ASTM A193 latest requirements. Anchor bolts shall be, sized as indicated on the Drawings.

D. Grout shall be non-shrinking, non-metallic, non-staining, such as Hallenite "Por-Rok", Sonneborn "Sonogrout", Penn Dixie, or Master Builders or approved equal Submit color samples and product literature for approval. Processed gravel fill as specified under Section 02200 EARTHWORK, herein.

E. Concrete for footings including reinforcing shall be 4000 p.s.i. 28-day air-entrained concrete conforming to the requirements and applicable provisions of Section M4 of the "MHD Standard Specifications" and Division 3 CONCRETE of the "MBTA Standard Specifications".

PART 3 - EXECUTION

3.01 TRASH RECPTACLE

A. Locate and install trash receptacles in locations shown on the Drawings and in conformance with approved Shop Drawings. Placement and height relationship shall be approved by the Engineer.

B. The Contractor shall be responsible for timing the delivery of trash receptacles so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling or vandalism.

C. All fabrication shall be accomplished using the highest standards of workmanship. Individual steel pieces shall be saw cut and carefully fit together. All connections shall be secured and flush. All fabricated items shall be fine sanded throughout to produce a high standard of surface smoothness. All surfaces and connections shall be without visible grinding marks, surface differentiation or variation.

D. Anchors shall be grouted in place as shown on the Drawings.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Trash receptacles shall be measured by the number of each type and size measured complete in place as specified and in accordance with approved Shop Drawings and sample mock-up.

4.02 PAYMENT

A. Trash receptacles shall be paid for at the Contract unit price each for each type and size and for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
1098.020	TRASH RECEPTACLE	EACH

END OF SECTION

SECTION 02453

TRAFFIC SIGNAL

PART 1 – GENERAL

1.01 DESCRIPTION

Work under this item shall conform to the relevant provisions of Section 800 of the Massachusetts Highway Department (MassHighway) Standard Specifications, the 2000 Manual on Uniform Traffic Control Devices (MUTCD), the City of Boston Transportation Department (BTD) standard specifications and drawings, and the following:

The work shall include the furnishing and installation of all of the following items: traffic hand holes complete with frame and cover and incidentals, conduit, vehicle loop detectors; all cables and wiring; ground rods, equipment grounding and bonding; and all other equipment, materials and incidental costs necessary to provide a complete, fully operational traffic control signal system as specified herein and as shown on the drawings/ plans. A list of major traffic signal items required is included on the drawings/plans.

The Contractor's attention is directed to the fact that the Item List shown on the drawings/plans is a list of the Major Items required only and all other incidental items as may be required to complete the work shall be included in these items.

Work under this item includes the removal of the existing traffic signal foundations as shown on the plans and as directed. The existing foundations shall be completely removed.

Field Wiring
The Contractor shall supply to Boston Transportation Department a completed form F28A for each location.

Existing Installations
The existing signal installation shall be maintained in operation throughout the construction period and until the new signal is ready for operation. The Contractor shall use temporary supports for signal heads as necessary to allow construction activities. Any temporary installations shall be in conformance with the MUTCD at all times. If the existing signal is to be turned off temporarily to allow for rewiring, police detail shall be used to control traffic at the intersection; shut down time shall not exceed six hours and shall be restricted to the hours from 9:00am to 3:30pm.

Once construction is complete and the new signal is in operation unused items of the old signal shall be completely removed and stacked as directed by the Engineer in accordance with Section 815.65. The Contractor shall dispose of old cable and unusable materials. No additional payment will be made for this work but it shall be included in the lump sum bid price.

1.05 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

E. Section 02400 Drainage and Sewer Systems

F. Section 02650 Existing Site Utilities

G. Section 02651 Electric Facilities Relocation

H. Section 02652 Gas Facilities Relocation

I. Section 02653 Telephone Facilities Relocation

J. Section 02654 Fire Alarm Facilities Relocation

K. Section 02800 Exterior Conduit Systems

N. Section 03310 Portland Cement Concrete

O. Section 05500 Miscellaneous Metal

P. Section 05920 Corrosion Control

Q. Section 15050 Basic Materials and Methods for Mechanical Work

PART 2 – PRODUCTS

2.01 HANDHOLES

A. Hand holes shall conform to the City of Boston specifications for hand hole of precast concrete per BTD Standard Detail A8.1 dated February 24, 1987 and A40 dated January 6, 1987, and shall be complete with applicable portions of BTD Standard Detail A40 dated January 6,1987, All.l dated November 6, 1986 and A12.4 dated November 6, 1986.

2.02 4 INCH RIGID PLASTIC CONDUIT

A. Nonmetallic conduit shall be PVC conforming to NEMA Standards Publication TC-2 or Schedule 80 type PVC conduit.

2.03 WIRE LOOP

A. Loop detector wire shall be PVC insulated, nylon jacketed, loose encased in a PVC or PE tube and conform to the requirements of IMSA Specification 51-5

B. Loop detector lead-in cable shall be two conductor No. 14 AWG, tinned copper stranded (19x27) conductors, polyethylene insulated (0.8 mi BW&SC standards, details and specifications.

2.04 TRAFFIC SIGNAL POST FOUNDATION

A. All materials shall be in compliance with MassHighway Section 801 as amended by BTD Standard Detail Al dated February 17, 1981.

PART 3 – EXECUTION

Work under this item shall conform to relevant provisions of MassHighway Section 800 and the following:

3.01 4 INCH RIGID PLASTIC CONDUIT

All procedures and work shall conform to the requirements of MassHighway as amended by Boston Transportation Department (BTD) specification for Rigid Plastic Conduit for Traffic Signals dated October 31, 1993 and detail A38 dated July 8, 1986 with the following amendments.

A. All bends in PVC conduit shall be made with a thermal bending device.

B. End bells shall be provided by the Contractor on the ends of all conduits entering or leaving hand holes and structures.

C. The Contractor shall follow manufacturer's recommendations regarding the handling bonding, coupling and installation of the conduit and fittings specified herein.

3.02 WIRE LOOP

A. The 3/8 inch saw cut for wire loop detectors in bituminous concrete pavement shall be made as shown on Boston Transportation Department Standard Detail All.l dated November 6, 1986 and the loop wire installation shall conform to the requirements of Boston Transportation Department Standard Detail A12.4 dated November 6, 1986.

B. The actual configuration of the stop line shall be as shown on plans or as directed by the Engineer. Prior to the actual installation, the Contractor shall mark the loop location on the site and request the Engineer's inspection and approval.

C. Slots in the bituminous concrete pavement shall be cut with a concrete sawing machine to a uniform depth as shown in the Boston Transportation Department's details and as required to accommodate all necessary loop turns or leads. Dry cutting the saw cuts will not be allowed. Diagonal saw cuts of at least twelve inches in length shall be made at each corner to prevent sharp bends in the wire. The diagonal cuts shall overlap the main cuts so that each wire-bearing slot has full depth.

D. Before installing the loop wire, the saw cut shall be cleared of debris and thoroughly dried. The wire shall be inserted in the cleared, dried slot with a blunt wooden or plastic tool that will not damage the insulation.

E. Loop wire crossing joints or noticeable cracks shall be protected with an approved insulating sleeve continuously for at least six (6) inches on each side of the joint or crack. The objective is to prevent bonding of the wire to the pavement. The ends of the sleeving material shall be taped to prevent entry of slot sealing compound into the sleeving. Said sleeving shall be furnished and installed at no extra cost and shall be incidental to the induction loop item. The end of the 1-1/2 inch PVC conduit shall be plugged with an approved material and loop wires entering the conduit shall be sleeved and taped as above.

F. No splice shall be used in the installation of any inductive loop or its lead-in to the appropriate hand hole. Loop lead-in wire will be spliced to the loop in the hand hole or hand hole and will be installed to the controller cabinet without any additional splices.

G. Where existing loop lead-in is to be reused, the contractor shall test the loop and lead-in cable separately in the presence of the engineer at the hand hole and than make a splice between the lead-in and the loop. The pavement slots for the bituminous concrete pavements shall all be filled with an approved two-component embedding sealer strictly in accordance with the directions of the manufacturer. The sealer shall be specifically recommended by the manufacturer for the use in new and existing bituminous concrete pavements.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Traffic Signal work shall be measured on a lump sum basis complete and in place.

B. Traffic Signals Location #1, intersection of Sumner Street and Maverick Street, shall be that work shown on the drawings for the traffic signal and shall be measured on a lump sum basis complete and in place.

4.02 PAYMENT

A. Payment for Traffic Signal work shall be made at the Contract lump sum price as indicated above.

B. Payment for relocation of existing traffic signals and temporary traffic signals during construction will be paid for under Item 0130.200 VEHICULAR AND PEDESTRIAN TRAFFIC MAINTENANCE AND CONTROL, see specification section 01570 TRAFFIC REGULATIONS.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
1651.131	Traffic Signals Location #1	LS

- END OF SECTION -

SECTION 02455

BOLLARDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to locate and install metal bollards and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02515 – Asphalt Block Paving and Flush Granite Curb Crosswalks.
3. Section 02520 – Granite Paving.
4. Section 02524 – Curbs, Gutters and Walks
5. Section 16120 – Wires and Cables.
6. Section 16500 – Lighting.

C. Coordinate installation of metal bollards with lighted bollards specified herein.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Contractor shall submit product literature and coordinated Shop Drawings, which shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and product literature.

C. Sample Mock-ups: Contractor shall provide a sample mock-up of the bollards, complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained.
2. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work and if approved, the sample shall become part of the final work.
3. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
4. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage

that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of metal bollards shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 BOLLARDS

A. Bollards shall be the "Washington Bollard" and the "Washington Lighted Bollard" as manufactured by Spring City Electrical Manufacturing Co., local representative Spec Lines, telephone 603-887-5511 or approved equal, in design, dimensional size and factory finish as manufactured by Visco, Eugene Oregon, (800) 341-1444 or Pennsylvania Globe Gaslight, local representative Spec Lines (603) 887-5511. Bollards shall meet the following criteria:

1. Height: Three foot three and one-half inches (3'-3 _") nominal height above grade.
2. Material: Caps and decorative base shall be one-piece heavy wall cast ductile iron meeting ASTM A536 Grade 65-45-12 latest requirements.

B. All required hardware shall be galvanized steel conforming to ASTM A325 hot-dip galvanized ASTM A153. Bolts shall be grouted in with threads down. All exposed hardware shall be primed (one coat) and painted (two coats) to match exterior metal color of bollard.

C. Surface appearance: Contractor shall be responsible for surface defects due to manufacture or fabrication of steel components. Contractor shall provide materials with acceptable appearance and smoothness, as judged solely by the Engineer. Contractor shall be required to grind or blast raw materials or fabrications prior to galvanizing. Do not apply finish coatings over galvanizing until surface appearance is acceptable to the Engineer.

D. All exterior metal, including hardware, shall be galvanized after fabrication. To maintain quality control and responsibility for performance of metal coatings, Contractor shall assign galvanizing and metal coatings specified in this Section to a single galvanizer. Galvanizer shall meet requirements of ANSI Q90. All coatings shall be lead free.

E. Paint for all exterior metal, color black, shall be:

One Coat:	Devoe Zinc Dust Primer DuPont Delux Galvanized Primer Glidden Rustmaster Galvanized Primer
Three Coats:	Devoe Bar-Ox Metal Finish DuPont Metal Protective Paint Glidden Speed Enamel

All coatings shall be lead free.

F. Grout shall be non-shrinking, non-metallic, non-staining, such as Hallenite "Por-Rok", Sonneborn "Sonogrout", Penn Dixie, or Master Builders or approved equal Submit color samples and product literature for approval.

G. Concrete for footings including reinforcing shall be 4000-psi 28-day air-entrained concrete conforming to the requirements and applicable provisions of Section M4 of the "MHD Standard Specifications" and Division 3 CONCRETE of the "MBTA Standard Specifications".

H. All lighted bollard electrical work shall be installed under specification section 16000. The lighted bollard voltage, wattage and lamp type is detailed in the Lighting Fixture Schedule, included in the electrical drawings.

PART 3 - EXECUTION

3.01 BOLLARDS

A. Locate and install bollards as shown on the Drawings and in conformance with approved Shop Drawings and sample mock-ups. Installation of the "Washington Lighted Bollard" is included in specification section 16000.

B. The Contractor shall be responsible for timing the delivery of bollards so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling or vandalism.

C. All bollards shall be set vertically plumb and securely anchored in cement concrete footings. The Engineer shall approve placement and height relationship.

D. All fabrication shall be accomplished using the highest standards of workmanship. Individual steel pieces shall be saw cut and carefully fit together. All connections shall be secured and flush. All fabricated items shall be fine sanded throughout to produce a high standard of surface smoothness. All surfaces and connections shall be without visible grinding marks, surface differentiation or variation.

E. Touch-up and Repair: For damaged surfaces, bolted connections and abraded areas. At galvanized surfaces, apply organic zinc repair paint. Galvanizing repair paint shall have 95% zinc by weight. Touch-up with aerosol sprays is not acceptable.

F. Protection: Protect materials, fabrications and assemblies with metal coatings from damage during construction using methods approved by fabricator, galvanizer, and coating manufacturer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Bollards shall be measured by the number of each type and size measured complete in place as specified and in accordance with approved Shop Drawings and sample mock-up.

4.02 PAYMENT

A. Bollards shall be paid for at the Contract unit price each for the quantities shown in the Schedule of Bid Prices, herein, as specified and in accordance with approved Shop Drawings and sample mock-ups.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0234.195	BOLLARDS	EACH
0234.196	LIGHTED BOLLARDS	EACH

END OF SECTION

SECTION 02457

TRAFFIC SIGNS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies traffic signage for streets, including the removal, protection, salvage, storage and reinstallation of existing traffic signs, and furnishing and installing new reflective aluminum traffic signs as indicated on the Drawings and specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01300, except as modified herein.

B. Provide shop drawings for fabrication, installation and erection of the work.

1. Show in detail the various portions of the work, graphic and art layouts, kind of material, size of members, methods of securing same together and connections.

2. Thickness of metal and detail of assembly and support shall be such as to provide ample strength and stiffness.

3. The message and size of legend for sign panels shall be as specified by the Engineer.

4. Submit manufacturer's instructions for cleaning of aluminum sign work.

1.03 QUALITY CONTROL

A. Quality control shall be in accordance with Section 01300, except as modified herein.

B. The approved manufacturer shall have experience in the type of work required; shall have a reputation for doing satisfactory work on time; and shall have recently successfully completed similar work.

C. All traffic signs, foundations and supports shall be removed, stored, fabricated and erected in accordance with the following:

1. U. S. Department of Transportation, Federal Highway Administration

   a. Manual on Uniform Traffic Control Devices (MUTCD)

2. American Association of State Highway and Transportation Officials (AASHTO)

   a. Specifications for Design and Construction of Structural Supports for Highway Signs, Luminaries and Traffic Signals.

3. The Massachusetts Department of Public Works Standard Drawings For Signs and Supports.

4. Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highways and Bridges (MHD Standard Specifications).

D. All work of this section shall meet the requirements of the Massachusetts Highway Department and City of Boston Transportation Department.

E. Installation work shall be performed by experienced workmen.

1.04 DELIVERY, HANDLING, TRANSPORTATION, STORAGE, AND PROTECTION

A. Delivery, handling, transportation, storage, and protection shall be in accordance with Section 01600, except as modified herein.

B. Deliver and store traffic signage in a manner to prevent cracking or stress of components, and to prevent mechanical damage or damage by the elements.

PART 2 - PRODUCTS

2.01 ALUMINUM SIGNS

A. Sign panels shall be fabricated from flat aluminum sheeting, ASTM B 209, Alloy 6061-T6, not less than 0.080 inches thick.

B. The sign background shall be reflective sheeting conforming to ASTM D 4956.

1. The reflective sheeting shall include a precoated pressure sensitive adhesive or a tack free heat activated adhesive which shall be applied as specified by the sheeting manufacturer to prepared flat surfaces without necessity of additional adhesive coats on the reflective sheeting or applied surface.

2. The reflective sheeting and its application shall conform to the requirements of the MHD Standard Specifications Section M9, Subsection M9.30.0.

C. Unless otherwise required, typefaces shall be Helvetica medium and shall be industry standard normal letter spacing.

D. Typefaces and letter spacing shall be approved by the Engineer before final manufacture.

E. Typical type and symbol layout for each sign type is indicated on the Drawings. All type shall be placed as indicated on the Drawings.

1. Should any design conflict occur in the manufacture and fabrication of the signage including, but not limited to, type not fitting, it shall be brought to the attention of the Engineer and resolved before continuing with the manufacturing and fabrication work.

F. Application of all lettering, arrows, and other artwork shall be by photographic silk screen. No modification of type faces or layout rules and the arrow/circle will be permitted without approval of the Engineer.

2.02 NEW SIGN POSTS

A. Erect sign and support in conformance with Massachusetts Highway Department Standard Drawings for Sign and Supports, Type P-5 Channel Post, at locations indicated on the Drawings.

B. Where indicated, erect sign on light pole.

2.03 FASTENERS AND MISCELLANEOUS ITEMS

A. Fasteners shall be concealed type, stainless steel, spanner head sheet metal screws.

B. Miscellaneous items including, but not limited to, shims, tabs, clips, screws, nuts, bolts, spacer sleeves, and supports shall be manufacturer's standard for this type of work.

PART 3 - EXECUTION

3.01 EXISTING SIGNS

A. Remove the existing signs and sign supports as directed, with care to prevent damage to same.

1. Remove any concrete attached to the sign supports.

2. Store signs in a secure place.

3. Clean and reinstall remaining signs in the location indicated on Drawings with mounting fixture or sign post set in concrete to a depth of 3 feet below finished grade.

4. Signs or sign supports damaged or lost shall be replaced by the Contractor, at no additional cost to the Authority.

3.02 INSTALLATION

A. Panels and signs shall be true, plumb and level, located as shown on the Drawings. Fasteners shall be located on the sign where shown on the shop drawings.

B. Install shims, tabs, clips, screws, nuts, bolts, spacer sleeves, supports and all necessary items to make the installation complete.

1. At the completion of the installation, work shall be checked over and readjusted as necessary.

C. The exact location of all signs will be determined by the Engineer.

D. Rejected work shall be replaced at no additional cost to the Authority.

3.03 PROTECTION

A. Protect sign work by an approved material. Remove material when directed by the Engineer.

B. Clear polyvinyl will be approved for this use only if the Contractor guarantees in writing that he can completely remove the protection without damage to the aluminum sign face.

3.04 CLEANING

A. Surfaces of aluminum sign work shall be cleaned as recommended by the manufacturer prior to the acceptance of the installation and when instructed by the Engineer.

B. Aluminum sign panels shall be free from dirt, scratches, handmarks and other blemishes.

C. Inspection shall be made by the Engineer to determine the condition of work. Damaged work, and work not in compliance with Contract Documents will be rejected and shall be replaced at no additional cost to the Authority.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section, complete in place, but all costs shall be included in the Contract Lump Sum Price for the work as indicated.

4.02 PAYMENT ITEMS

Item No.	Item Description	Unit
1042.012	SIGNAGE	LS

END OF SECTION

SECTION 02460

TREE GRATES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to locate and install tree frames and grates and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02490 – Planting.
2. Section 02520 – Granite Paving.
3. Section 02524 – Curbs, Gutters and Walks
4. Section 02525 – Color Imprinted Concrete Pavement.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Contractor shall submit product literature and coordinated Shop Drawings, which shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and product literature. Shop Drawings and/or Product Literature shall be submitted for the following:

1. Tree frame and grate - Shop Drawings and product literature.
2. Soil separator - Product literature
3. Exterior metal color system - Product literature.

C. Sample Mock-ups: Contractor shall provide a sample mock-up of the tree frame and grate, complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained.
2. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work and if approved, the sample shall become part of the final work.
3. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
4. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

D. Samples: Submit representative samples to Engineer for selection and approval, as follows. Do not order materials until Engineer's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Tree frame and grate: Submit one.
2. Exterior metal color system: Submit one sample.
3. Soil separator: Submit one sample.
4. Peastone mulch: Submit one-gallon sample.

E. Contractor shall submit to the Engineer a notarized certificate of compliance with all galvanizing and color treatment requirements including ASTM number and weight of zinc coating in ounces per square foot.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as

required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of tree grates shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 TREE FRAMES AND GRATES

A. Tree grates shall be "Starburst Series 2" Model M7206-2 with an M7206-F steel frame for square grate and frame as manufactured by Ironsmith, local distributor M.E. O'Brien (508) 359-4200, or approved equal in design, pattern, dimensional sizing and factory finish. As manufactured by as manufactured by Urban Accessories local distributor Fox Associates, Inc. (207) 763-4410 or Neenah Foundry Company, Neenah, Wisconsin telephone (800) 558-5075, local representative Mel Grant Associates telephone (800) 345-1432.

B. All tree grate castings shall be manufactured true to pattern and component parts, and shall fit together in a satisfactory manner. The castings shall be of uniform pattern and quality, free from blowholes, hard spots, shrinkage, distortion or other defects.

C. Tree grates shall be ADA compliant and shall have maximum three-eighths (3/8") inch openings. Tree grates shall allow for 16", 26" or 36" inch openings to accommodate trees. Engineer shall select actual size of opening on a tree-by-tree basis.

D. Tree grates shall be cast iron per latest requirements of ASTM-A48, Class 35B. Tree grates shall be cleaned by sand blasting prior to applying factory-applied finish. Finish shall be a factory applied finish of one coat primer, and one top coat black polyurethane finish; preparation and application per manufacturer's standards.

E. Manufacturer of tree grates shall provide factory manufactured steel angle-frames and steel anchors as required for the selected tree grate. Steel angle-frames shall be roll-formed from mild steel angle conforming to the latest requirements of ASTM A36. Frames shall be fabricated with proper clearance built-in for an accurate fit with grate and the mounting required at each type of paved surface. Steel anchor bolts, three-eighths (3/8") inch, shall conform to the relevant provisions of Section M8 of the Standard Specifications. Frames shall be black polyurethane paint preparation and application per manufacturer's standards. Factory finish shall meet or exceed ADA's recommended static coefficient of friction for slip resistance of .6.

F. Hardware shall be galvanized as per latest requirements of ASTM- A153 and primed and painted to match paint on tree grates and frames.

G. Steel anchors and the manufacturer shall provide steel bolts for installation of all units. Hardware shall be, sized in accordance with manufacturer's recommendation and to accommodate each type of adjacent paving. Steel hardware shall be fabricated from steel conforming to ASTM A325 latest requirements and shall be galvanized as per latest requirements of ASTM- A153 and primed and painted to match paint on tree grates and frames.

H. Contractor shall provide touch-up paint from the manufacturer to match factory finish. All coatings shall be lead-free and slip resistant.

I. Grout shall be non-shrinking, non-metallic, non-staining, such as Hallenite "Por-Rok", Sonneborn "Sonogrout", Penn Dixie, or Master Builders or approved equal Submit color samples and product literature for approval.

J. Concrete for footings including reinforcing shall be 4000 p.s.i. 28-day air-entrained concrete conforming to the requirements and applicable provisions of Section M4 of the "MHD Standard Specifications" and Division 3 CONCRETE of the "MBTA Standard Specifications".

K. Peastone shall conform to the requirements of M2.01.6 of the "MHD Standard Specification", shall be free of all deleterious materials, shall be gray in color, and shall conform to the following gradation:

Sieve Size	Percent Passing
3/8 "	85-100
1/2"	15-45
3/4"	0-20

L. Soil separator shall be Mirafi 700x as manufactured by Mirafi, Inc. or approved equal telephone (800) 438-1855, color black.

PART 3 - EXECUTION

3.01 TREE FRAMES AND GRATES

A. Locate and install tree grates complete with peastone mulch as shown on the Drawings and in conformance with approved Shop Drawings. The Engineer shall approve placement and relationship to tree.

B. The Contractor shall be responsible for timing the delivery of tree frames and grates so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling or vandalism.

C. The color system specified is a factory finish coating. Upon arrival on the job site it is the Contractor's responsibility to handle the tree grates in such a manner as to minimize damage to the finish. Should any damage occur to the coating surface in shipping or handling at the job site, it is the responsibility of the Contractor to touch up said damage using suitable touch-up materials, either liquid or aerosols, available from the manufacturer. Dry film thickness of applied repair paint to be not less than what was originally specified herein.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Tree frames and grates shall be measured by the number of each type and size measured complete in place, including soil separator, peastone mulch and all required hardware as specified and in accordance with approved Shop Drawings.

4.02 PAYMENT

A. Tree frames and grates shall be paid for at the Contract unit price each for the quantities shown in the Schedule of Bid Prices, herein, as specified and in accordance with approved Shop Drawings.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0284.120	TREE GRATES	EACH

END OF SECTION

SECTION 02465

BICYCLE RACK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to locate and install bicycle racks and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02515 – Asphalt Block Paving and Flush Granite Curb Crosswalks.
3. Section 02520 – Granite Paving.
4. Section 02524 – Curbs, Gutters and Walks

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc. of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Contractor shall submit product literature and coordinated Shop Drawings, which shall show required sizes, dimensions, sections,

profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and product literature. Shop Drawings and/or Product Literature shall be submitted for the following:

1. Bicycle rack - Shop Drawings and product literature.

C. Sample Mock-ups: Contractor shall provide a sample mock-up of the tree frame and grate, complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained.
2. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work and if approved, the sample shall become part of the final work.
3. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
4. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post

work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photo litho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of bicycle racks shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 BICYCLE RACKS

A. Bicycle racks shall be the Bike-Link, Model No. BL-2B high security bike rack manufactured by Bike Security Racks Company, Rumney, New Hampshire (603) 786-2757, local distributor Blake Industries (617) 337-8772, or approved equals the "Pi Rack" as manufactured by Landscape Forms, Inc. Kalamazoo, MI (800) 521- 2546 or the "RR-200" as manufactured by Rally Racks Santa Rosa, CA (707) 5280-8083.

1. Bolts hall be a ½" x 10", vandal resistant, and shall be hot dipped, galvanized.
2. The lead expansion shield shall be of the correct size to receive the bolt specified by the manufacturer.
3. Provide bicycle racks with a factory finish, color of bicycle rack shall be black. All coatings shall be lead free.

B. Contractor shall provide touch-up paint from the manufacturer to match factory finish. All coatings shall be lead-free.

C. Grout shall be non-shrinking, non-metallic, non-staining, such as Hallenite "Por-Rok", Sonneborn "Sonogrout", Penn Dixie, or Master Builders or approved equal Submit color samples and product literature for approval.

D. Concrete for footings including reinforcing shall be 4000-psi 28-day air-entrained concrete conforming to the requirements and applicable provisions of Section M4 of the "MHD Standard Specifications" and Division 3 CONCRETE of the "MBTA Standard Specifications".

PART 3 - EXECUTION

3.01 BICYCLE RACKS

A. Locate and install bicycle racks complete as shown on the Drawings and in conformance with approved Shop Drawings and sample mock-up.

B. The Contractor shall be responsible for timing the delivery of bicycle racks so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling or vandalism.

C. The color system specified is a factory finish coating. Upon arrival on the job site it is the Contractor's responsibility to handle the bicycle racks in such a manner as to minimize damage to the finish. Should any damage occur to the coating surface in shipping or handling at the job site, it is the responsibility of the Contractor to touch up said damage using suitable touch-up materials, either liquid or aerosols, available from the manufacturer. Dry film thickness of applied repair paint to be not less than what was originally specified herein.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Bicycle racks shall be measured by the number of each type and size measured complete in place, as specified and in accordance with approved Shop Drawings and sample mock-ups.

4.02 PAYMENT

A. Bicycle racks shall be paid for at the Contract unit price each for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
1112.000	BICYCLE RACK	EACH

END OF SECTION

SECTION 02486

SEEDING AND SODDING

PART 1 - GENERAL

Under Part 1 – General, delete it in its entirety and substitute the following:

1.01 DESCRIPTIONS

A. This Section specifies all lawn sod work and related items as indicated on the Drawings and/or as specified herein, and includes, but is not limited to, the following:

1. Fine grading and loaming.
2. Installation of sod.
3. Maintenance and protection.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02490 – Planting.
2. Section 02516 – Concrete Pavers.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.

3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.

1.04 SUBMITTALS AND SAMPLES

A. Samples: Prior to ordering the below listed materials, submit representative samples to Engineer for selection and approval in accordance with requirements of GENERAL CONDITIONS as follows. Do not order materials until Engineer's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Loam Borrow: The Contractor shall provide representative samples for testing and approval. Two test samples of ten pounds (10) each shall be taken and analyzed from each potential loam source. Contractor shall deliver samples to a testing laboratory approved by the Engineer and shall have testing reports sent directly to the Engineer and pay all cost. Report shall be submitted at least one month before any loaming is to be done and shall include the following tests and recommendations:
    a. Mechanical and chemical analysis shall be by a public extension service agency or a certified private testing laboratory in accordance with the current "Standards" of the Association of Official Agricultural Chemists.
    b. Soil Test Report shall include a mechanical sieve analysis with soil classification. Organic content and Cation Exchange Capacity (CEC) shall be reported. Chemical analysis shall include pH (1:1 soil-water ratio), buffer pH, Soluble Salts (1:2 soil-water ratio), Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Manganese, Ferric Iron and Sulfate.
    c. Soil test report shall clearly recommend appropriate application of limestone, fertilizer and other soil additives required to correct soil deficiencies and to adjust loam as necessary to support successful turf growth.
3. Soil Additives: Submit product literature on all soil additives to be used on the project.

B. Certificates of Compliance: Submit five (5) copies of the manufacturer's Certificate of Compliance to the specifications for the seed mix for sod.

1.05 CERTIFICATE OF ACCEPTANCE

A. The Engineer will inspect all work upon the written request of the Contractor received at least ten days before the anticipated date of inspection.

B. Sodded lawns shall be maintained an initial minimum of ninety (90) days or until all areas of the sod are firmly rooted and final the Engineer has given approval. After written approval and the initial ninety (90) day maintenance period are complete the one-year guarantee period as specified herein shall commence.

C. Engineer 's inspection shall determine if the lawns are acceptable and whether the initial ninety (90) day maintenance period shall continue in any part.

D. After all necessary corrective work and clean up has been completed, the Engineer will certify in writing the acceptance of the sodded lawns.

1.06 EXAMINATION OF CONDITIONS

A. All areas to be hydroseeded or sodded shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, drainage problems, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be hydroseeded or sodded, and he shall assume full responsibility for the work of this Section.

1.07 QUALITY ASSURANCE

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

B. Subcontractor Qualifications: Landscaping work shall be assigned to an experienced and qualified landscaping subcontractor with a minimum of five (5) years of experience and who employs experienced workmen under the full time supervision of a qualified foreman.

PART 2 – PRODUCTS

Under Part 2 – Products delete it in its entirety and substitute the following:

2.01 LOAM BORROW

A. Loam borrow shall be screened loam and shall be a "sandy loam" determined by mechanical analysis ASTM D-422 and based on the "USDA Textural Classification." It shall conform to the following sand, silt and clay distribution for material passing the #4 sieve:

Textural Classification	% Total Weight
Sand (0.05 – 2.0 mm dia. range)	less than 52%
Silt (0.002 – 0.05 mm dia. range)	28%-50%
Clay (less than 0.002 mm dia. range)	7%-27%

Soil test shall include breakdown of sand and subfractions from very course to very fine.

B. Maximum grain size shall be one and one-quarter inches largest dimension. The maximum retained on the one-quarter inch sieve shall be 20 percent by weight of the total sample. Test shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

C. Screened loam shall be free from plants and their roots and other debris and extraneous matter. It shall be uncontaminated by salt, water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC^2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 milliohms/cm. (test material passing #4 sieve).

D. Material shall consist of natural topsoil, free from subsoil, obtained from an area that has never been stripped. It shall be removed to a depth of one (1) foot or less if subsoil is encountered. Loam shall be of uniform quality screened free of hard clods, stones greater than ½ inch, stiff clay, hardpan, sods, partially disintegrated stone, lime, cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, glass, sticks, or any other undesirable material.

E. Screened loam shall have an acidity range of pH 6.0 to pH 6.5 and shall contain not less than 5% nor more than 10% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230° F. plus or minus 9°. To adjust organic matter content, the soil may be amended, prior to site delivery by the addition of composted humus. Use of organic amendments is acceptable only if random soil sampling indicates thorough incorporation.

F. Screened loam shall have a Cation Exchange Capacity (CEC) of between 10 and 15.

G. All screened loam shall be provided from off site sources. The screened loam must be brought to the site, meeting all specification requirements. There must be no mixing or amending of soil on site. No loam shall be spread prior to screening. The loam must not be handled or moved when in a wet or frozen condition.

H. To assure screened loam purchased fulfills specified requirements regarding textural analysis, organic matter content, CEC, and pH, soil testing results will be obtained by the Contractor and submitted to the Engineer for approval one month before any soil is delivered to the site.

2.02 SOIL ADDITIVES

A. Commercial fertilizer, peat, humus or other additives shall be used to counteract soil deficiencies as recommended by the soil analysis and as directed by the Landscape Architect.

1. Commercial fertilizer shall be a product complying with the State and United States Fertilizer Laws. Deliver to the site in the original unopened containers, which shall bear the manufacturer's certificate of compliance covering analysis, which shall be furnished to the Engineer. At least 50% by weight of the nitrogen content shall be derived from organic materials. Fertilizer shall contain not less than the percentages of weight of ingredients as follows, but shall be adjusted as recommended by the soil analysis:

Nitrogen	Phosphorus	Potash
5%	10%	5%

B. Humus shall be natural humus, reed peat or sedge peat. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form. According to the methods of testing of A.O.A.C., latest edition, the acidity range shall be approximately 5.5 pH to 7.5 pH and the organic matter shall be not less than 85% as determined by loss on ignition. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis.

C. Limestone: Ground limestone shall be an approved agricultural limestone containing not less than 85% of total calcium or magnesium carbonates. Limestone shall be ground to such fineness that 50% will pass through a 100-mesh sieve and 95% will pass through a 20-mesh sieve.

D. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 18% available phosphoric acid.

E. Sulphur shall be commercial or flour sulphur, unadulterated, and shall be delivered in containers with the name of the manufacturer, material, analysis and net weight appearing on each container.

2.03 SOD

A. Sod shall be a mixture of 50% Fylking Kentucky Bluegrass and 50% Red Fescue or Chewing's Fescue, or equal approved by the Engineer. Sod shall be well-rooted turf free from disease, insect pests, weeds and any other harmful matter.

B. Sod shall be machine cut at a uniform soil thickness of 3/4 inch, plus or minus 1/4, at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5%. Broken pads and torn or uneven ends will not be acceptable. Sod shall be at least two years old from time of original seeding.

C. Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section.

D. Sod shall be harvested, delivered and installed within a period of twenty-four (24) hours. Sod not transplanted within this period shall be inspected and approved by the Engineer prior to its installation. Soil on sod pads shall be kept moist at all times.

2.04 WATER

A. The Contractor shall be responsible for furnishing his own supply of water to the site at no extra cost. If possible, the Owner will furnish the Contractor upon request with an adequate source and supply of water at no charge. However, if the Owner's water supply is not available or is not functioning the Contractor will be held responsible to furnish adequate supplies at his own cost.

B. Any work injured or damaged due to the lack of water, or the use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation.

PART 3 – EXECUTION

Under Part 3 – Execution, delete it in its entirety and substitute the following:

3.01 FINE GRADING AND LOAMING

A. After the areas to be loamed have been brought to grade, and immediately prior to dumping and spreading the screened loam, the subgrade shall be loosened by disking or rototilling to a depth of at least three inches to permit bonding of the loam to the subsoil.

B. Contractor shall then regrade surface and remove from loosened subsoil all stones greater than two (2") inches and all debris or rubbish from the loosened subsoil. Such material shall be removed from the site.

C. Screened loam shall be placed and spread over approved areas to a depth sufficiently greater than six (6") inches for sodding so that after natural settlement and light rolling, the completed work will conform to the lines, grades, and elevations indicated. Supply additional loam, after testing and approval as may be needed, to give the specified depths and finished grades under the Contract.

D. Disturbed areas outside the limit of sodding shall be spread with six (6") inches of screened loam to the finished grade, without additional cost to the Owner.

E. No subsoil or loam shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at top of slopes. Grades shall be established which are accurate to one tenth of a foot either way. Connect contours and spot elevations with an even slope. Engineer shall approve all grading prior to proceeding with sodding.

G. After screened loam has been spread; it shall be carefully prepared by hand raking. Screened loam shall also be free of smaller stones in excessive quantities as determined by the Engineer.

H. The whole surface shall then be rolled with a hand roller weighting not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement or rolling shall be filled with additional loam and the surface shall be regraded and rolled until it presents a smooth and even finish corresponding to the required grades.

I. Contractor shall obtain Engineer 's written approval of fine grading and bed preparation before doing any sodding.

3.02 INCORPORATION OF SOIL ADDITIVES

A. Soil additives for sodding shall be spread and thoroughly incorporated into the layer of screened loam by harrowing or other methods approved by the Landscape Architect. The following soil additives shall be incorporated:

1. Spread ground limestone as required by soil analysis to achieve a pH of 6 to 6.5, but the maximum amount applied shall be one pound per square yard.
2. Spread fertilizer at the rate of twenty (20) pounds per one thousand (1,000) square feet or more as required by soil analysis.
3. Spread Superphosphate at the rate of twenty (20) pounds per one thousand (1,000) square feet.
4. Incorporate humus in the soil as required by soil analysis prior to delivery to site. Contractor shall have loam retested with organic matter incorporated and shall obtain approval prior to bringing any loam on the site.

3.03 SODDING

A. Limit of work line shall be the limit of sodding unless otherwise indicated on the Drawings. All areas on the plan shall be loamed and sodded only after written approval of the Engineer of bed preparation. All disturbed areas outside the limit of sodding shall be sodded.

B. Planting season for sod shall be from April 15 to June 1 or from August 15 to November 1. The actual planting of sod shall be done, however, only during periods within this season, which are normal for such work as determined by weather conditions and by accepted practice in this locality. At his option, and on his responsibility, the Contractor may plant sod under unseasonable conditions at no increased cost to the Owner.

C. Sodding of lawns shall be done only by experienced workmen under the supervision of a qualified foreman. Sodding shall consist of soil preparation, sodding, rolling, pegging, weeding, watering and otherwise providing all labor and materials necessary to secure the establishment of acceptable turf.

D. The soil on which the sod is laid shall be reasonably moist and shall be watered, if directed by the Engineer. The sod shall be laid smoothly, edge to edge, and where continuous or solid sodding is called for on the plans sod shall be laid with the longest dimension parallel to the contours. Sodding shall start at the base of slopes and progress upward in continuous parallel rows. Vertical joints between sods shall be staggered. Immediately after laying sod shall be pressed firmly into contact with the sod bed by tamping, rolling, or by other approved methods so as to eliminate all air pockets, provide true and even surfaces, insure knitting and protect all exposed sod edges, but without displacement of the sod or deformation of the sod surface.

3.04 MAINTENANCE AND PROTECTION

A. Maintenance shall include resodding, mowing, watering, weeding, liming, and fertilizing

B. Maintenance shall begin immediately after any area is sodded and shall continue for the initial minimum of ninety (90) days or until final written acceptance, whichever is longer.

C. Watering of Sodded Areas:

1. First Week: The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of an adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least two (2) inches.
2. Second and Subsequent Weeks: The Contractor shall water the lawn as required to maintain adequate moisture, in the upper two inches of soil, necessary for the promotion of deep root growth.
3. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. If the Owner's water supply is not available the Contractor shall furnish at his cost sufficient watering equipment to apply one complete coverage to the sodded areas in an eight (8) hour period.

D. Protection:

1. Sodded areas shall be protected by a three-foot high barrier constructed of two-by-four stakes or iron pipes set eighteen inches in the ground at ten foot intervals and connected by No. 10 wire. Flags of white cloth shall be secured to the wire at center points between stakes.
2. Barriers must be raised immediately after sodding and shall be maintained until final acceptance of all sodding

E. Mowing for sodded areas: The first mowing of sodded areas shall not be attempted until the sod is firmly rooted and secure in place. Not more than 40% of the grass leaf shall be removed by the initial or subsequent mowings. Grass height shall be maintained between 2 and 2-1/2 inches unless otherwise specified. Thereafter THE contractor shall maintain the grass at two inches until written acceptance by the Engineer. Mowing shall include removal of clippings.

F. Fertilizing: A second application of fertilizer, as specified herein, shall be applied after one (1) season of growth of a minimum of two (2) months duration, but only during the months of April, May, August or September. Fertilizer shall be applied at the rate of thirty (30) pounds per one thousand (1,000) square feet.

G. Liming: If more than one initial application of limestone is required by the soils analysis to bring the pH of the screened loam to a specified range, the Contractor shall be responsible for all additional required lime applications.

H. Resodding: In the opinion of the Engineer, all areas of sod that have browned or not taken root shall be replaced by the Contractor until all areas are covered with a

satisfactory growth of grass. Resodding together with necessary grading, fertilizing, liming shall be done at the expense of the Contractor.

PART 4 –MEASUREMENT AND PAYMENT

Under Part 4 – Measurement and Payment delete Subsection 4.01 in its entirety and substitute the following:

4.01 MEASUREMENT

A. The quantity to be paid for Lawn Sod shall be the quantity based on actual measurements made over the general contour of the areas sodded, complete in place and accepted for Lawn Sod including loam borrow.

4.02 PAYMENT

A. Lawn Sod including required loam borrow shall be paid for at the contact unit price per square foot which price shall include the cost of furnishing, providing, and installing materials complete in place, including all related work specified, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER.	PAYMENT ITEM	UNIT
0282.300	LAWN SOD	SY

END OF SECTION

SECTION 02490

PLANTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all planting work and related items as indicated on the Drawings and/or as specified herein, and includes, but is not limited to, the following:

1. Loam borrow.
2. Preparation of planting medium.
3. Planting.
4. Maintenance.

B. The sum of 10% of the total cost of the planting contract shall be retained and paid to the Contractor after replacements have been made, one year from the date of acceptance of original planting.

C. Contractor shall schedule tree selection and digging operations so as to comply with nursery industry recognition of 'Spring Dig Only' or 'Fall Hazard' plant materials. No substitutions of plant materials will be allowed for fall planting based on unavailability due to the 'Spring Dig Only' or 'Fall Hazard' restrictions. Contractor and Engineer shall have selected and had the material dug during the previous spring or fall.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02460 – Tree Grates.
2. Section 02486 - Sodding
3. Section 02513 – Bituminous Concrete Pavement.
4. Section 02524 – Curbs, Gutters and Walks.
5. Section 02515 – Asphalt Block Paving and Flush Granite Curb At Crosswalks.
6. Section 02520 – Granite Paving.
7. Section 02525 – Color Imprinted Concrete Pavement.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ASNS: "American Standard for Nursery Stock," ANSI Z 60.1, latest edition, published by the American Association of Nurserymen (AAN).
6. SPN: "Standardized Plant Names," latest edition, by the American Joint Committee on Horticultural Nomenclature.
7. AOAC: Association of Official Agricultural Chemists.
8. ANSI: "American National Standard Institute "Standards for Tree Care Operations Tree Shrub and Other Woody Plant Maintenance", latest edition.
9. USDA: United States Department of Agriculture, latest requirements for "USDA Textural Classification."
10. Hillier's Manual of Trees and Shrubs, 1971, Hillier & Sons.
11. Hortus III, 1976, L.H. Bailey Hortorium.
12. Manual of Cultivated Conifers, 1965, P. Den Ouden & B. K. Boom.
13. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Samples: Prior to ordering the below listed materials, submit representative samples to Engineer for selection and approval in accordance with requirements of GENERAL CONDITIONS as follows. Do not order materials until Engineer's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Loam Borrow: The Contractor shall provide representative samples of screened loam borrow for testing and approval. Two test samples of ten (10) pounds each shall be taken and analyzed from each potential loam source. Contractor shall deliver samples to testing laboratory, have testing report sent directly to the Engineer and pay all costs. Report shall be submitted at least one month before any loam is brought on to the site.

   a. Mechanical and chemical (pH soluble salts) analysis shall be by a public extension service agency or a certified private testing laboratory in accordance with the current "Standards" of the Association of Official Agricultural Chemists.
   b. Soil Test Report shall include a mechanical sieve analysis with soil classification. Organic content and Cation Exchange Capacity (CEC) shall be reported. Chemical analysis shall include pH (1:1 soil-water ratio), buffer pH, Soluble Salts (1:2 soil-water ratio), Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Manganese, Ferric Iron and Sulfate.
   c. Soil test report shall clearly recommend appropriate limestone, fertilizer and other additives required to adjust loam as specified.

4. Fertilizer: Submit one (1) sample packet of fertilizer and six (6) certificates showing composition and analysis for fertilizer.
5. Soil testing: Submit test results and product literature for the recommended treatment for both loam borrow and material from planting holes.
6. Soil additives: Submit a certificate showing composition for each additive.

7. Test results from testing of plant materials for disease or pests: Submit three (3) copies.
8. Disease and pest controls: Submit test results and product literature for the recommended treatment.
9. Weed control: Submit test results and product literature for the recommended treatment.
10. Legal disposal of materials: Provide notarized copies of agreements between the Contractor and owners of land used for disposal.
11. Shop Drawings for aeration system for trees.

B. Certification: Submit Certification of license for the Arborist.

C. Certification: Submit manufacturer's certified analysis for standard products. Submit certified analysis by a recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists for other materials.

D. Schedule: Contractor shall submit a Schedule for Planting to the Landscape Architect and Owner for approval to insure that the schedule of work will minimize the potential for plant damage and to insure timely installation of all material. Contractor shall schedule tree selection and digging operations so as to comply with nursery industry recognition of 'Spring Dig Only' or 'Fall Hazard' plant materials. If required the schedule shall show selection of the material dug during the previous spring or fall.

1.05 CERTIFICATE OF ACCEPTANCE AND GUARANTEE

A. Following completion of all plant material installation, the Contractor shall request the Engineer in writing for a formal inspection of the planting work. If plant materials and workmanship are acceptable, the Engineer will give written notice to the Contractor stating that the work has received provisional acceptance and that the ninety- (90) day maintenance period shall commence.

1. The ninety- (90) day maintenance period shall occur only during the growing season May1 to October 15.
2. If final inspection occurs at the end of the growing season, the ninety- (90) day maintenance period shall be extended and shall start at the beginning of the next growing season starting as of May 1 of the next year.
3. If the ninety-day maintenance period is not complete by October 15, it shall be extended into the next growing season starting again as of May 1.
4. Plants that show obvious decline or loss of 5% of healthy growth shall be inspected by a licensed Arborist or Horticulturist to determine the cause of the decline. The plant shall then be treated and if further decline or loss occurs the plant shall be removed and replaced. All plants of the same species shall also be inspected. Replacements shall conform in all respects to the specifications for new plants and shall be planted in the same manner.
5. Plants that die or show obvious decline or loss of 10% of healthy growth during the maintenance period shall be removed and replaced at once, unless designated otherwise in writing by the Engineer. Replacements shall conform in all respects to the specifications for new plants and shall be planted in the same manner.

B. After the minimum ninety- (90) day maintenance period, the Contractor shall again request the Engineer, in writing, for an inspection to determine whether the plant material is acceptable. If the plant material and workmanship are acceptable, the Engineer will give written notice to the Contractor stating that the one-year guarantee period begins from the date of the Certificate of Acceptance.

C. If a substantial number of plants are sickly or dead at the time of final inspection, acceptance will not be granted, and the Contractor's responsibility for maintenance of all plants shall be extended until replacements are made. All dead and unsatisfactory plants shall be promptly removed from the project. Replacements shall conform in all respects to the specifications for new plants and shall be planted in the same manner. The Contractor shall maintain replacements for ninety- (90) days after written approval of the replacements by the Engineer.

D. Plants shall be guaranteed for a period of one year after the Certificate of Acceptance and shall be alive and in satisfactory growth at the end of the guarantee period. Plants that die, show obvious decline or loss of 10% of healthy growth during the guarantee period, shall be removed and replaced at once, unless designated otherwise by the Engineer.

E. The sum of 10% of the total cost of the planting contract shall be retained and paid to the Contractor after replacements have been made, one year from the date of acceptance of original planting.

F. At the end of the guarantee period, inspection shall be made again by the Engineer. Any plant required under this contract that is dead or unsatisfactory shall be removed from the site. Each plant shall show at least ninety- five (95%) percent healthy growth and shall have the natural character of a plant of its species in accordance with the American Nurserymen's Association Standards. Dead or unsatisfactory plants shall be replaced during the normal planting season, until the plants live through one year. The Engineer shall make a final inspection for acceptance after the replacements have lived through one year.

G. All replacements shall be plants of the same species, variety, and size specified in the PLANT SCHEDULE and all costs shall be borne by the Contractor, except for possible replacements due to vandalism or neglect on the part of others.

1.06 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas to be planted shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Landscape Architect prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be planted, and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing and maintaining plants temporarily and/or rehandling plants prior to final installation.

C. Contractor shall verify all utility locations and elevations prior to excavation. Before construction starts, all utility companies, public and private must be contacted including

those in control of utilities not shown on this plan. See Chapter 370 Acts of 1963 Massachusetts and contact "DIG SAFE" 1-800-322-4844. Report any discrepancies in writing to the Engineer and receive written instructions prior to proceeding.

1.07 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Contractor must be knowledgeable of National Arborist Association standards and have at least five- (5) years experience involving this scale and type of work. Contractor must be a licensed/certified Arborist in the State of Massachusetts. Submit license/certification for approval.

B. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

C. Subcontractor Qualifications: Landscaping work shall be assigned to an experienced and qualified landscaping subcontractor employing experienced workmen under the full-time supervision of a qualified foreman with a minimum of five years experience on projects similar in scale to this one.

1.08 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Engineer's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.09 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Owner. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Owner, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 LOAM BORROW

A. Loam borrow shall be screened loam and shall be a "sandy loam" determined by mechanical analysis and based on the "USDA Textural Classification." It shall conform to the following grain size distribution for material passing the #4 sieve:

Textural Classification	% Total Weight
Sand (0.05 – 2.0 mm dia. range)	less than 52%
Silt (0.002 – 0.05 mm dia. range)	28%-50%
Clay (less than 0.002 mm dia. range)	7%-27%

Soil test shall include breakdown of sand subfractions from course to very fine.

B. Maximum grain size shall be one and one-quarter inches largest dimension. The maximum retained on the one-quarter inch sieve shall be 20 percent by weight of the total sample. Test shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

C. Screened loam borrow shall be uncontaminated by salt, water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC^2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 milliohms/cm. (Test material passing #4 sieve).

D. Material shall consist of natural topsoil, free from subsoil, obtained from an area, which has never been stripped. It shall be removed to a depth of one (1) foot or less if subsoil is encountered. Loam shall be of uniform quality screened free of hard clods, stiff clay, hardpan sods, partially disintegrated stone, lime, cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, glass, sticks, or any other undesirable material.

E. Screened loam borrow shall have an acidity range of pH 6.0 to pH 6.5 and shall contain not less than 5% nor more than 10% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F. plus or minus 9 degrees. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is acceptable only if random soil sampling indicates thorough incorporation.

F. Screened loam borrow shall have a Cation Exchange Capacity (CEC) of between 10 and 15.

G. All screened loam borrow provided from off site sources shall be brought to the site meeting all specification requirements. There must be no mixing or amending of soil on site. The screened loam must not be handled or moved when in a wet or frozen condition.

H. To assure screened loam borrow purchased fulfills specified requirements regarding textural analysis, organic matter content, CEC and pH, soil testing results will be obtained by the Contractor and submitted to the Engineer for approval before any soil is delivered to the site.

2.02 SOIL ADDITIVES AND FERTILIZER

A. Additives shall be used to counteract soil deficiencies as recommended by the soil analysis and as approved by the Landscape Architect.

B. Commercial fertilizer shall be a product complying with State and United States Fertilizer Laws. Deliver to the site in the original unopened containers, which shall bear the manufacturer's Certificate of Compliance covering analysis, which shall be furnished to the Engineer. At least 50% by weight of the nitrogen content shall be derived from organic materials. Phosphorus shall be soluble. Fertilizer shall contain not less than the percentages of weight of ingredients as follows, but shall be adjusted to meet all recommendations of the soil analysis.

	Nitrogen	Phosphorus	Potash
For deciduous trees and shrubs	10%	6%	4%

C. Humus shall be natural humus, reed peat or sedge peat. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form. The acidity range shall be approximately 5.5 pH to 7.5 pH and the organic matter shall be not less than 85% as determined by loss on ignition testing in accordance with A.O.A.C.'s latest methods of testing. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis.

D. Peat moss shall be composed of the partly decomposed stems or leaves of any of several species of sphagnum moss. It shall be free from wood, decomposed colloidal residue and other foreign materials. Peat moss shall have an acidity range of 4.5 pH to 6.5 pH as determined in accordance with the latest methods of testing of A.O.A.C. Its water absorbing ability shall be a minimum of 1,100% by weight on an oven-dry basis.

E. Manure shall be well-rotted unleached stable manure not less than eight months and not more than two years old. It shall be free from sawdust, shavings or refuse of any kind and shall not contain over twenty-five percent straw. The Contractor shall furnish information as to the kind of disinfectant or chemicals, if any that may have been used in storage of the manure.

F. Bone meal shall be fine ground, steam cooked, packinghouse bone with a minimum analysis of 23% phosphoric acid and 4% nitrogen.

G. Lime for adjustment of pH: An acceptable dolomite limestone containing not less than 85% of total carbonates, ground so that 50% will pass a 100 mesh sieve and 90% will pass a 20 mesh sieve.

H. Aluminum Sulfate for adjustment of pH: Unadulterated, 57% (Ortho Division, Chevron Chemical Company), or equal.

2.03 PLANT MATERIALS

A. The Contractor shall furnish and plant all plants shown on the Drawings, as specified, and in quantities, sizes and varieties as shown on the PLANT SCHEDULE. No substitutions will be permitted. All plants shall be nursery grown unless specifically authorized to be collected. All plants shall be balled and burlapped or grown in containers.

B. A complete list of plants, including a schedule of sizes, quantities and other requirements, shall be shown on the Drawings. In the event that quantity discrepancies or material omissions occur between the list of plant materials on the PLANT SCHEDULE and the Drawings, the higher number of plants shall govern.

C. Plants shall be in accordance with the ASNS Standards of the American Association of Nurserymen. Botanical plant names shall be in accordance with plant designations included in Hortus III and/ or Hillier's Manual of Trees and Shrubs.

D. All plants shall be typical of their species or variety and shall have a normal habit of growth and be legibly tagged with the proper name. Only plant stocks grown within hardiness Zones 1 through 5, as established by the Arnold arboretum, Jamaica Plain, Massachusetts will be accepted. The Contractor's suppliers must certify in writing that the stock has actually been grown under Zone 5 or hardier conditions. Plants not so certified will not be accepted.

E. The root system of each plant shall be well provided with fibrous roots. All parts shall be sound, healthy, and vigorous, well branched and densely foliated when in leaf. All plants shall be free of disease, insect pests, eggs or larvae.

F. All plants shall be balled and burlapped with 100% cloth burlap and must be moved with the root systems as solid units with balls of earth firmly wrapped with untreated eight (8) ounce burlap, firmly held in place by a stout cord or wire. No poly-burlap or wire cages shall be allowed on plant materials. Any plants delivered to the site with materials other than cloth burlap shall automatically be rejected and the Contractor shall remove them from the site within twenty-four (24) hours.

1. The diameter and depth of the balls of earth must be sufficient to encompass the fibrous root feeding system necessary for the healthy development of the plant.

2. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during the process of planting or after the burlap, staves, ropes or platform required in connection with its transplanting have been removed.
3. The plants and root balls shall remain intact during all operations.
4. All plants that cannot be planted at once shall be heeled in by setting on the ground, covering the balls with soil, and watering them.
5. Collected stock will not be accepted.
6. Plant material from cold storage will be accepted.

G. The height of the trees (measured from the crown of the roots to the tip of the top branch) shall not be less than the minimum size designated. Take caliber measurement six (6") inches above ground level up to and including four (4") inch caliber sizes and twelve (12") inches above the ground for larger sizes. The trunk of each tree shall be a single trunk growing from a single unmutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire or other causes. No pruning wounds shall be present having a diameter exceeding two inches and such wounds must show a vigorous bark on all edges. Plants shall not be pruned prior to delivery. All street trees shall have a minimum branching height of seven (7') feet above finished grade.

H. Shrubs shall meet the requirements for spread or height specified in the PLANT SCHEDULE. The measurements for height shall be taken from the ground level to the average height of the shrub and not to the longest branch. The thickness of each shrub shall correspond to the trade classification "No. 1." Single stemmed or thin plants will not be accepted. The side branches must be generous, well twigged, and the plant as a whole well branched to the ground. The plants must be in a moist vigorous condition, free from dead wood, bruises, or other root or branch injuries. Plants shall not be pruned prior to delivery.

I. Container grown stock shall have been in a container long enough for the root system to develop sufficiently to hold its soil together firm and whole. Containerized, which means they were field-grown and then transferred into a container is not acceptable.

J. Plants delivered by truck and plants requiring storage on site shall be properly wrapped and covered to prevent wind drying and desiccation of branches, leaves or buds. Plant balls shall be firmly bound, unbroken, reasonably moist to indicate watering prior to delivery and during storage, and tree trunks shall be free from fresh scars and damage in handling. No trees with double leaders or twin heads will be acceptable without the written approval of the Engineer. The Contractor shall reject such plants at the time of delivery by the nursery/supplier.

K. If trees come wrapped from the nursery, all wrapping shall be removed during planting.

2.04 WATER

A. The Contractor shall be responsible for furnishing his own supply of water to the site at no extra cost. If possible, the Engineer will furnish the Contractor upon request with an adequate source and supply of water at no charge. However, if a water supply is not

available or not functioning, the Contractor will be held responsible to furnish adequate supplies at his own cost. Water shall be free from impurities injurious to vegetation.

B. Any work injured or damaged due to the lack of water, or the use of too much water, shall be the Contractor's responsibility to correct. If plant material dies as a result of too much or too little water the Contractor shall replace plants in-kind at no increased cost to the Owner.

2.05 MULCH

A. Mulch for shrub planting shall be aged pine bark mulch aged a minimum of six (6) months. The mulch shall be dark brown in color, free of chunks and pieces thicker than 1/4 inch. Mulch must be free of stringy material, and shall not contain, in the judgment of the Engineer, an excess of fine particles. Submit sample for Engineer 's approval.

2.06 ANTIDESICCANT

A. Antidesiccant shall be emulsions or other materials, which will provide a protective film over plant surfaces permeable enough to permit transpiration, and specifically manufactured for that purpose.

B. Manufacturer of antidesiccant shall be subject to the Landscape Architect's approval and shall be used only after approval by the Engineer. Antidessicant shall be delivered in containers of the manufacturer and shall be mixed according to the manufacturer's instructions.

2.07 AERATION SYSTEM FOR TREES

A. Crushed stone shall conform to three-quarter inch as specified under M2.01.0 Crushed Stone of the "MHD Standard Specifications".

B. Soil Separator shall be three-eighth- inch thick and composed of dimpled polymeric sheet adhered to a heavy-duty woven filter fabric on one side. Polymeric sheet shall be high impact resistant P.V.C. material capable of withstanding 18,000 psf pressures per ASTM D 1621, latest requirements. Filter fabric shall be a woven polypropylene monofilament clendared geotextile with a tensile strength of 400 x 250 lbs., burst strength of 490 psi, and a flow rate of 25 gpm per square foot per requirements of ASTM D 4491, latest requirements. Installed soil separator shall have a minimum flow rate of 18 gpm per foot width in accordance with ASTM D 4716, latest requirements. Geotextile shall be securely bonded to the polymeric sheet so that the geotextile will remain a rigid surface after backfilling. Geotextile shall extend three inches beyond the sheet on all sides to allow for required overlaps with adjacent mats and turning over at ends.

C. Polyvinyl chloride (PVC) Pipe shall be perforated pipe that is pressure rated, normal impact, Commercial Standard CS-207 stamped with the approval of the NSF, meeting ASTM 1785, D2241, rigid polyvinyl chloride, SDR 26 pressure rated for 160 psi. Fittings shall be pressure rated normal impact, socket type conforming to CS-207, SDR 21, and pressure rated for 200 psi and stamped with approval of NSF.

PART 3 - EXECUTION

3.01 PLANTING

A. Furnishing and planting of any plant material, complete, includes the digging of the holes for individual plants and local excavation required for planting beds, provisions of soil additives and screened loam for planting soil mix. Plants shall be furnished at the specified size shown on the PLANT SCHEDULE with roots in the specified manner. Included in the work shall be the labor of planting and maintenance as specified herein.

B. Contractor shall strictly adhere to the limits of motorized vehicular access as shown on the Drawings, including allowable limits of machine excavation of plant beds. All work outside the limits of motorized vehicular access shall be done by hand or other approved methods.

C. Seasons for Planting:

1. Spring: Deciduous materials - March 21 through May 15.
2. Fall: Deciduous materials - October 1 through December 1.
3. Contractor shall schedule tree selection and digging operations so as to comply with nursery industry recognition of 'Spring Dig Only' or 'Fall Hazard' plant materials. No substitutions of plant materials will be allowed for fall planting based on unavailability due to the 'Spring Dig Only' or 'Fall Hazard' restrictions. Contractor and Engineer shall have selected and had the material dug during the previous spring or fall.

D. Plant selection:

1. At least ten days prior to the expected planting date, the Contractor shall request, in writing, that the Engineer provide a representative to select and tag stock to be planted under this Section. The Contractor shall arrange and pay for the transportation and overnight accommodations, if necessary, for the Engineer's representative during the period of time required to select and tag plant material.
2. The Contractor shall be responsible to certify the availability of required plants in specified sizes from his sources of supply prior to requesting the Engineer to make plant source inspections. In the event that plants at the inspection location are found to be unavailable or if insufficient size, the Contractor shall be liable to reimburse the Contracting Authority for all costs of the Engineer's hourly services incurred during unproductive inspection trips.
3. Unless specifically designated otherwise, the Contractor or his representative shall accompany the Engineer on all field trips for plant material selection.
4. All plants for the project shall be individually tagged for approval with the Engineer's seals, and no plants shall be accepted for delivery to the site without such seals.
5. Plants shall be selected by the Engineer at the place of growth for conformity to specification requirements as to quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work. Cost of replacements shall be borne by the Contractor.

E. Planting:

1. Location for all plants and outlines for planting areas shall be staked on the ground by the Contractor for approval by the Engineer before any individual plant pits are dug. If ledge, underground obstructions, or utilities are encountered the Engineer shall be notified immediately.
2. Maintain at all times during the planting operations one or more stockpiles of approved screened loam from stockpile.
3. Plant pits shall be excavated with vertical sides. Holes for trees shall be at least three (3') feet greater than the ball and six (6') six inches deeper than the ball. All trees shall be planted at the same grade that they grew in the nursery and shall be placed so that the nursery marked north side faces north on site unless directed differently by the Engineer in the field. Contractor shall locate the union of root and trunk on each plant prior to digging the hole in order to determine depth of whole required.
4. All shrubs shall be planted in a continuous bed and shall be at least eighteen inches (18") greater than the ball and at least six inches (6") deeper than the ball. Contractor shall locate the union of root and trunk on each plant prior to digging the hole in order to determine depth of hole required.
5. All plant roots and earth balls must be damp and thoroughly protected from sun and wind from the beginning of the digging operation, during transportation and on the ground until the final planting. The plants shall be planted in the center of the holes and at the same depth as they previously grew. All trees shall have their north side marked at the nursery and shall be planted with the north side facing north on the site, unless directed differently by the Engineer in the field.
6. Install aeration system for trees as shown on the Drawings and in accordance with approved Shop Drawings.

F. Planting medium:

1. Screened loam, organic material and bonemeal for planting medium for backfill for individual plants shall be thoroughly premixed in the proportions of one part of organic material with seven parts of loam together with ten (10) pounds of bonemeal per cubic yard of mixture. All materials for planting medium shall be approved prior to any material being brought on to the site.

G. Watering:

1. All plants shall be flooded with water twice within the first twenty-four hours of the time of planting.
2. All plants for the first three months shall be watered at least once each week unless sufficient rainfall has occurred. In case of drought water weekly until rain resumes.
3. At each watering the soil around each tree shall be thoroughly saturated. If requested by the Engineer the Contractor shall test soil moisture with water gauges to ensure that plants have received sufficient moisture. If sufficient moisture is retained in the soil, as determined by the Engineer, the required watering may be reduced. Trees shall receive a minimum of ten gallons of water per week. Shrubs shall receive a minimum of five gallons of water each week.
4. Individual trees shall be watered by laying a hose at the base of the plant and allowing water to trickle for 30-60 minutes depending on seasonal conditions. To water entire beds of plants a soaker hose shall be used. Trees shall be tested with water gauges to ensure that they have received sufficient moisture.

H. Pruning:

1. Each plant shall be pruned in accordance with the Standards for Pruning of the National Arborist Association to preserve the natural character of the plant. All pruning shall be performed by a certified/licensed Arborist. Pruning shall be as directed by the Engineer and shall be kept to a minimum.
2. All dead wood or suckers and all broken or badly bruised branches shall be removed. Never cut a leader on trees.

I. Mulching:

1. Mulch shall be placed over a maximum of twelve (12") inches in diameter off the tree trunk for individual trees and over the entire area of shrub and/or groundcover planting beds to a depth of three inches after settlement not later than one week after planting. Submit sample for approval.
2. No mulch shall be applied prior to the first watering of plant materials.
3. NO MULCH SHALL EVER BE MOUNDED LIKE A VOLCANO. Mulch shall always lie flat on the ground. Keep mulch away from stem(s) of plant.

J. Alternate locations shall be selected by the Engineer, in the event that rock or underground construction work or obstructions are encountered in any plant pit or bed excavation work to be done under this contract,

K. Absolutely no debris may be left on the site. Excavated material shall be removed as directed by the Engineer. Repair any damage to site or structures to restore them to their original condition as directed by the Engineer at no cost to the Contracting Authority.

3.02 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted and shall continue through both provisional acceptance and the minimum ninety- (90) day maintenance period as specified, herein.

B. Maintenance shall consist of keeping the plants in a healthy growing condition and shall include watering, weeding, cultivating, remulching, removal of dead material, and resetting plants to proper grades or upright position. Seasonal spraying for insects or disease shall also be included as required and/or as directed by Engineer.

1. Plants shall be inspected for watering needs at least twice each week during the growing season and watered as necessary to promote plant growth and vitality.
2. Individual plant pits shall be kept free of weeds.
3. Plants that die or show obvious decline, loss of 5% of healthy growth during the maintenance or guarantee period, shall be removed and replaced at once, unless designated otherwise by the Engineer.
4. Spraying for both insect pests and diseases shall be included during the maintenance period as required and as directed by Engineer.

C. During the maintenance period, any decline in the condition of plantings shall require the Contractor to take immediate action to identify potential problems and undertake

corrective measures. If required, the Contractor shall engage a professional Arborist and/or Horticulturist to inspect plant materials and to identify problems and recommend corrective procedures.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Planting shall be measured as a lump sum price for all planting complete in place, including all materials specified herein for installation of trees including screened loam borrow.

4.02 PAYMENT

A. Planting shall be paid for at the Contract lump sum price as shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEMS	UNIT
0284.145	PLANTING	LUMP SUM

END OF SECTION

SECTION 02513

BITUMINOUS CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the construction of bituminous concrete pavement for patching of utility trenches, walkways, curbing and pavement to the lines, grades, compacted thickness, and cross sections indicated on the plans and in accordance with Standard Specifications Section 02513, except as modified herein.

B. Related Work: Related sections include, but not necessarily limited to the following:

1.	Section 02200	Earthwork
2.	Section 02400	Drainage and Sewer Systems
3.	Section 02650	Existing Site Utilities

C. Patching of bituminous pavements within public ways shall be done by the infrared process.

1.02 QUALITY CONTROL

A. Hold Point- Job Mix Formulae

4. Should a change of sources of materials be made, furnish a new job mix formula source of supply for approval before using the new material.

PART 2 – PRODUCTS

2.01 MATERIALS

B. Cutback Asphalt

2. Medium Curing: AASHTO M82, Grade MC-70 for prime coat.

C. Bituminous Emulsions

1. Asphaltic Emulsions: AASHTO M140, Grade RS-1 for prime and tack coat

PART 3 – EXECUTION

3.04 PRIME COAT

B. Clean the existing surface of foreign matter and loose material before applying prime and tack coats. Apply prime coat by mechanical means at a rate indicated or as directed.

1. Apply prime coat of bituminous material at a rate of 0.20 gallons per square yard.

2. Apply tack coat of bituminous material at a rate of 0.10 gallons per square yard.

C. Apply a tack coat of bituminous material on any bituminous concrete pavement to receive a subsequent layer, and at joints and at contact surfaces of structures in pavement.

D. Apply prime and tack coats when surface is dry, surface and atmospheric temperature is above 50 degrees F and when weather conditions allow the proper construction of the coats.

E. Allow primed surface to cure completely. Provide additional drying time for the prime and tack coats, as required to prevent coats from being picked up by traffic and equipment. Maintain and protect coated surfaces from damage until bituminous concrete paving is completed. Supply, spread and remove sand to protect surface and to blot up excess material as directed by the Engineer.

3.05 SPREADING AND FINISHING

A. General

7. The mixtures shall be placed and compacted only at such time as to permit the proper inspection and checking by the Engineer.

8. The mixtures shall be placed only upon approved surfaces that are clean and dry; and when weather conditions are suitable. No bituminous material shall be applied when the temperature is below 32 degrees F.

3.07 JOINTS

F. At locations where new bituminous concrete pavement abuts existing pavement, saw cut the pavement to expose a neat, even vertical surface for the full thickness of the pavement and the gravel subbase. Cutback the existing pavement an additional six inches from the edge of the existing subbase. Saw cut pavement in a straight line. Establish line controls to guide the cutting operations. No ragged or irregular edges shall be permitted.

1. Apply a thin uniform tack coat of hot bitumen, as specified in Paragraph 2.01.C.1 of this section, to existing pavement surfaces coming in contact with new bituminous concrete pavement.

2. Protect cut and planed edges of pavement from damage and edge breakdown resulting from construction operations. Edge breakdown resulting from construction operations after final cut is made shall be corrected as directed by the Engineer at no additional cost to the Authority.

3.09 FIELD QUALITY CONTROL

E. Gravel and crushed stone subbase courses shall be installed under Section 02509, SUBBASE AND BASE COURSE. Do not proceed with paving until the subbase course is in the proper condition to receive the pavement. Do not allow traffic to travel on the prepared subbase course.

3.12 TRENCHES

A. Saw cutting and removal of existing bituminous concrete pavement and placement of new bituminous concrete pavement at trenches, shall be included in the cost for the respective item to which it pertains.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Bituminous concrete pavement for patching will be measured by the square yard, complete in place and include sawcutting, compaction and all other necessary items.

C. No separate measurement will be made for infrared patching of bituminous pavement.

E. Bituminous concrete pavement will be measured by the ton complete in place.

F. Gravel borrow for bituminous concrete base will be measured by the cubic yard complete in place.

4.02 PAYMENT

A. Bituminous concrete pavement for patching, bituminous concrete walkway, bituminous concrete pavement and gravel borrow will be paid for at the Contract unit prices for the quantities determined as specified above.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0261.115	SAWCUTTING BITUMINOUS CONCRETE	LF
0261.126	BITUMINOUS CONCRETE EXCAVATION BY COLD PLANE	SY
0261.144	BITUMINOUS CONCRETE PATCH	SY
0261.200	CLASS 1, BITUMINOUS CONCRETE PAVEMENT TYPE I-1, TOP COURSE	TN
0261.201	CLASS 1 BITUMINOUS CONCRETE PAVEMENT TYPE I-1 BASE COURSE	TN

END OF SECTION

SECTION 02514

BRICK PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the installation of exterior brick paving on concrete base course and mortar joints in accordance with MBTA Standard Specifications Section 02514, except as modified herein.

1.02 STANDARDS

A. Where references are made in these Specifications to standard specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein, and shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. MBTA Standard Specifications: Massachusetts Bay Transportation Authority Standard Specifications for Construction, latest edition.
2. MHD Standard Specifications: Commonwealth of Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials "Annual Book of ASTM Standards", latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.
8. BIA: Brick Institute of America, latest edition.

1.03 SUBMITTALS

A. Samples: Prior to ordering the below listed materials, submit representative samples to Landscape Architect for selection and approval, as follows. Do not order materials until Landscape Architect's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Brick for paving: Submit a minimum of twelve (12) samples bricks showing color range.
2. Mortar: Submit one sample showing color.

B. Sample Panels:

1. Build sample panels of not less than one hundred and fifty (150) square feet each for the following in the areas designated by the Landscape Architect:
   a. Brick on concrete base course with mortar joints.
2. Obtain Landscape Architect's acceptance of visual qualities of sample panels before proceeding with the final work.
3. If the first panels are not approved, the Contractor shall provide additional samples until an approved sample panel is obtained for each of the above.
4. If approved, the sample panels shall become part of the final paving.

1.04 PRODUCT HANDLING AND STORAGE

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all brick, stone and precast concrete items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.05 QUALIFICATIONS

A. A Contractor or Subcontractor shall perform the paving work with a minimum of (5) five years of acceptable experience in the installation of materials specified herein on projects comparable to this project and under the supervision of a qualified foreman with a minimum of five (5) years of experience.

1.06 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Authority to cover statutory requirements.

1.07 GUARANTEES

A. The Contractor shall obtain, in the Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product literature. All of these guarantees shall be in addition to, and not in lieu of, other liabilities, which the Contractor may have under law.

B. In addition to manufacturers' guarantees, the Contractor shall warrant all work of paving, both materials and labor, for a period of one year from date of acceptance by the Authority. The Contractor shall be held strictly responsible for all parts of his work. If failure in the work develops within one (1) year of the date of final approval and acceptance of the work, the Contractor shall be required to replace all faulty materials at his full expense. To this end, the Contractor is advised to purchase materials under a warranty from the manufacturer guaranteeing proper service under the conditions, which are established by the Drawings, Specifications, and local conditions.

C. The Contractor, at no additional cost to the Authority, shall furnish all required labor and materials to fulfill the requirements of this warranty to the Authority. All labor shall include premium time to correct any faulty material or workmanship.

1.08 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Authority's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Authority, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Authority to discontinue such practice.

PART 2 - PRODUCTS

2.01 CONCRETE BASE COURSE

A. Use concrete materials as specified in Section 02524 CURBS, GUTTERS AND WALKS of the "MBTA Standard Specification", latest edition, except as modified herein. Refer to Drawings for thickness of base course.

B. Concrete for base course shall obtain strength of 4,000-psi at twenty-eight (28) days.

C. Gravel borrow shall conform to Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specification", latest edition. Refer to Drawings for depth of subbase required.

D. Preformed joint filler shall be non-extruding and resilient preformed expansion joint filler and shall conform to AASHTO M213 requirements for premolded rigid cane fiberboard impregnated throughout with asphaltic compound. The Contractor shall provide certification that the asphalt cement content is at least 35% by weight of the filler. All

expansion joints shall be a minimum of ½" thick. All expansion joint filler to be full depth of slab thickness.

E. Contractor shall install expansion joints a minimum of thirty feet (30') on center and where brick on concrete pavement abuts all vertical surfaces including, but not limited to, all buildings, structures, curbs, columns, walls, light poles, etc.

F. Expansion Joint Handling:

1. Deliver materials in manufacturer's original containers, clearly labeled with manufacturer's name and address and product identification.
2. Store materials in original containers protected from direct contact with the ground and from the elements.
3. Store materials above ground on framework or blocking, and cover with protective waterproof covering. Provide for adequate air circulation throughout material stacks.

G. Joint sealer for non-color concrete for use at expansion and control joints shall meet Federal Specification TT-S-00230C, Type II, Class A, and shall be a sealing compound, synthetic, rubber base, single component, chemically curing material. Color(s) of sealant shall be manufacturer's standard color(s) as selected by the Owner's Representative. (Sikaflex-la by Sika Chemical Corp. (201) 933-8801 or equal).

H. Expansion joint backer rod shall be round closed cell polyethylene rod with a diameter 1/8" (3mm) larger than the width of the joint.

2.03 BRICK ON CONCRETE BASE COURSE

A. Paving brick shall be clay brick, uniform in size and evenly burned, and when broken shall show a dense structure free from lime, air pockets, cracks, and laminations.

B. Brick shall, in all respects, except as herein specified, meet the requirements of the Standard Specifications for paving brick ASTM Designation C902 Class SX Type 1 Application PS. Brick shall be Boral Bricks Inc., "Heartland Flashed" wire cut pavers, or approved equal by Stiles and Hart, Inc. "City Hall Pavers" sand struck pavers, or Richtex Inc. "Monticello #123" wire cut pavers. The local distributor of all specified three brick choices is Spaulding Brick Co., Inc. (617) 666-3200.

1. Brick pavers shall be 8" inches by 4" inches by 2-1/4" inches nominal, Pavers shall be 75% light and 25 % dark for sidewalk paving. Submit samples of blend for approval.
2. Pavers which vary more than one-eighth inch (1/8") in thickness or pavers with stones showing on the surface and other defective bricks shall be culled by the manufacturer prior to delivery to the site.
3. When the brick arrives on the site, the bricklayer shall cull all defective pavers prior to installation, including pavers with stones in the surface.
3. Brick pavers shall have no end or side lugs.
4. Brick shall have absorption of less than 4% average with five (5) hour boil tests.
5. Compressive strength shall not be less than 10,000 psi.
6. Brick shall pass a minimum of fifty cycles of freeze thaw.

7. Samples must be submitted in quantities sufficient to illustrate the full range of color. On approval of the samples, construct a sample panel at the site of not less than one hundred and fifty (150) square feet.

C. Setting Bed Mortar: shall conform to ASTM C 270, Type S latest requirements, except the latex polymer additive shall be mixed with cementitious materials and aggregate in lieu of water.

1. Cement: conform to ASTM C 150 latest requirements, Type I, complying with the staining requirements of ASTM C 91, latest requirements for not more than 0.03% water-soluble alkali. Furnish Type I, except Type III may be used for setting bluestone in cold weather.
2. Sand shall comply with ASTM C 144 latest requirements:

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4	100	100
#8	95 to 100	95 to 100
#16	70 to 100	70 to 100
#30	40 to 75	40 to 75
#50	10 to 35	20 to 40
#100	2 to 15	10 to 25
#200	---	0 to 10

3. Hydrated lime: conform to ASTM C 207, latest requirements.
4. Latex polymer additive: one of the following:
   a. Laticrete #3701 mortar manufactured by Laticrete International, Woodbridge, CT.
   b. Hydroment Acrylic mortar admixture manufactured by Bostik, Middleton, MA.
   c. Silpro #C21 manufactured by Silpro Masonry Systems, Ayer, MA.
5. White Portland cement conforming with ASTM C 150, complying with staining requirements of ASTM C 91 latest requirements for not more than 0.03% water soluble alkali. Furnish Type I, except Type III may be used for setting bluestone in cold weather.
6. Mortar coloring additive shall be SGS colors, manufactured by Solomon Grind Chem Service, Springfield, IL. Mortar coloring additive shall have mineral oxide pigment and be certified by supplier to be resistant to alkali, light, and weather, and be of a chemical composition unaffected by cement and free of water and soluble salts. Color of pigment shall not exceed 10% of Portland cement in mortar. The Landscape Architect shall approve color of mortar.
7. Latex polymer additive: one of the following:
   a. Laticrete #3701 mortar manufactured by Laticrete International, Woodbridge, CT.
   b. Hydroment Acrylic mortar admixture manufactured by Bostik, Middleton, MA.
   c. Silpro #C21 manufactured by Silpro Masonry Systems, Ayer, MA.

D. Concrete base course with gravel borrow subbase course shall be as specified in Paragraph 2.01, herein. Refer to Drawings for thickness of concrete base course.

PART 3 – EXECUTION

3.01 CONCRETE BASE COURSES

A. Make any necessary corrections to gravel subbase course provided, spread, fine graded, compacted under Section 02509 SUBBASE AND BASE COURSES, of the MBTA Standard Specification, latest edition, on prepared subgrade and gravel borrow subbase to the lines, grades, compacted thickness and cross sections indicated on the Drawings.

B. Place concrete materials as specified in Section 02524 CURBS, GUTTERS AND WALKS of the MBTA Standard Specification, latest edition, except as modified herein.

1. Placing concrete:

a. Set forms carefully to alignment and grade, and hold rigidly in place by use of steel or wood stakes. Clean forms thoroughly each time they are used and coat with oil as often as necessary to prevent concrete from adhering.
b. Refer to Drawings for thickness of base course.
c. Deposit concrete on the base course in successive batches in such manner as to require as little re-handling as possible and distribute to such depth that, when consolidated and finished, slab thickness will be obtained at all points.
d. Any portion of a batch of concrete, which becomes segregated, shall be thoroughly mixed with the main body of the batch during the process of spreading. The operation of deposition and spreading shall be continuous between expansion joints.
e. Do not place concrete on a soft, muddy or frozen base course. Do not permit workmen to walk in the concrete with boots or shoes covered with earth or other foreign substances.
F. Consolidate concrete thoroughly by tamping, spading and vibrating to eliminate honeycombing and voids. Spade carefully to avoid dislocation of reinforcing materials, dowels and joint installing devices.

2. Concrete Finishing for Base Courses:

a. Finish surface to grade and cross-section by suitable wood floats. After floating, broom finish to improve bond with a medium hair push broom drawn over the surface transverse to the line of traffic. Before the final finish, the surface of the base course shall be checked and any irregularities of more than one eighth inch (1/8") in one hundred (100) feet shall be eliminated.
b. Divide the surface of base course into rectangular areas by means of control joints. Form control joints in the fresh concrete by cutting a groove in the top portion of the base course and finishing all edges using a jointing tool. The complete surface shall have a uniform broom finish.
c. Expansion Joints: Provide herein expansion joints a minimum of thirty - (30') feet on center and/or as shown on the Drawings and where curbs are adjacent to walks. Provide expansion joints where walks abut steps or other structures.
d. The concrete surface shall be maintained free of cracks, grease spots or sealing agents, which would inhibit bonding.

C. The minimum cross slope on all paved surfaces shall be 1 ½ % percent.

D. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved or surfaced and make, or have made, any necessary adjustments in such structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches drainage structures.

E. All paving shall be checked with a ten - (10') foot straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies one-quarter (1/4") inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished surfaces.

3.03 BRICK ON CONCRETE BASE COURSE

A. Immediately before commencing work of laying pavers, thoroughly clean surfaces to be covered with pavers of all dust, dirt and other foreign matter. Place three quarter (3/4") inch deep control bars directly over the base. The depth control bars shall be set carefully to bring the pavers, when laid, to proper grade.

B. Install brick pavers in full mortar setting bed with mortar joints as shown on the Drawings and in accordance with Section 02514 BRICK PAVING of the MBTA Standard Specification, latest edition.

C. Do not lay pavers in inclement weathers, or when rain or snow is immanent. Do not lay pavers when the ambient temperature is below 36° F.

D. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches the drainage structure.

E. The minimum pitch on all paved surfaces shall be 1 1/2% percent unless indicated on the Drawings to be a lower percentage.

F. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies one-quarter (1/4") inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

G. Joints:

1. Mortar joints shall be a maximum of three-eights (3/8") of an inch.

H. The Contractor shall protect the brick paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Owner shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Landscape Architect.

PART 4 – METHOD OF MEASUREMENT AND PAYMENT

4.01 METHOD OF MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Items shall be measured for payment as follows and shall be the actual and verified quantities, complete in place and approved:

1. Brick pavers on concrete base course will be measured per square foot, which shall include the cost of furnishing, providing, and installing all materials complete in place, including concrete base course and compacted gravel subbase course.

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. The quantity, determined as provided above, will be paid for at the following unit prices for the specified items. This would include the cost of furnishing, providing, and installing all materials complete in place as specified and as required to complete the work.

1. Brick pavers on concrete base course will be paid for at the contract unit price per square foot complete in place.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0426.154	BRICK PAVING	SQUARE FOOT

END OF SECTION

SECTION 02515

ASPHALT BLOCK PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to install asphalt block paving with flush granite curb at crosswalks and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02509 – Subbase and Base Courses.
3. Section 02513 – Bituminous Concrete Pavement.
4. Section 02524 – Curbs, Gutters and Walks.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.

8. National Building Granite Quarries Association, Inc. latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Coordinated Shop Drawings shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and/or product literature.

1. Crosswalk layout - Shop Drawings.
2. Drainage matt – Product literature.

C. Sample Mock-ups: Sample mock-up for each type of pavement shall be complete in place. The Engineer in writing shall approve the quality of workmanship before permanent construction is started. Samples can be built in final location, but if not approved they shall be removed at no increased cost to the Owner.

1. Build sample panels of not less than one hundred and fifty (150) square feet for the following in the areas designated by the Engineer:
   a. Asphalt block on bituminous concrete base course.
   b. Asphalt block crosswalk pavement with flush granite curb.
2. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work.
5. Obtain Engineer 's written acceptance of sample (s) before proceeding with the final work.
6. If the first samples are not approved, the Contractor shall provide additional samples until an approved sample is obtained.
7. If approved, the sample shall become part of the final work.
8. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

D. Samples: Submit representative samples to Engineer for selection and approval, as follows. Do not order materials until Engineer's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Asphalt block: Submit a minimum of six (6) pavers showing color range and finish for each type of paver selected.
2. Flush granite curb for crosswalk: Submit a minimum of one- (1) samples granite with correct dimensions and surface finishes.
3. Sand: Submit a one-quart sample for each type.
4. Drainage matt: Submit one sample.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of installation of asphalt block paving and asphalt block with flush granite curb shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

1.11 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such

determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Engineer to cover statutory requirements.

PART 2 - PRODUCTS

2.01 ASPHALT BLOCK PAVING

A. Asphalt block pavers shall be manufactured by Hanover Architectural Products, local distributor Specifier Services, Inc. telephone (603)-669-1329 or an approved equal. The asphalt cement shall conform to Type 3 ASTM D312 requirements with a penetration at 77° F., 100 G., 5 second of minimum 15mm and maximum of 35mm. The blocks shall have a permissible 1/16" plus or minus tolerance in any direction. Nominal size, finish, and color as follows location as indicated on the Drawings:

1.	Vehicular pavers: 6"x 12"x 3" thick	Matrix #14	Ground/Tudor finish*
2.	Pedestrian pavers: 6"x 12"x 3" thick	Matrix #10	Ground/Tudor finish*

B. Bituminous concrete base courses shall be as specified in Section 02513 BITUMINOUS CONCRETE PAVEMENT of the "MBTA Standard Specifications" and as specified herein.

C. Processed gravel subbase course and dense graded stone base course shall be as specified in Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications" and as specified herein.

D. Prefabricated drainage composite shall be Miradrain 9000 as manufactured by Mirafi, Inc., Charlotte, NC, telephone (704) 523-7477, or approved equal. Contractor shall provide required accessories for installation.

E. Asphalt cement for the bituminous setting bed shall comply with ASTM D3381 latest requirements, viscosity grade A.C.10 or A.C.20. The fine aggregate for the bituminous setting bed shall be clean, hard sand with durable particles and shall be free from adherent coating, lumps of clay, alkali salts, and organic matter. It shall be uniformly graded from "coarse" to "fine" and all passing the No. 4 sieve and comply with these gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and course aggregated ASTM C136-81. The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300° F. at an asphalt plant. The approximate proportion of materials shall be seven percent (7%) cement asphalt and ninety-three percent (93%) fine aggregate. Each ton shall be apportioned by weight in the approximate ratio of 145 pounds asphalt to 1,855 pounds sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

F. Neoprene-Modified Asphalt Adhesive shall conform to the following requirements:

MASTIC (asphalt adhesive)

Solids (base)	75 + 1%
Lbs./Gal.	8-8.5 lb.
Solvent Varson (over 100°F. Flash)	
BASE (2% Neoprene, 10% Asbestos-free fibers, 88% Asphalt)	
Melting Point - ASTM D-36	200°F. Min.
Penetration-77°F. 100 Gram Load	
5 Second (.1 mm)	23.27
Ductility-ASTM D-113-44 @25°C	
5 cms/per minute	125 cm Min.

G. Jointing material: ASTM C144 latest requirements clean masonry sand as follows:

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4	100	100
#8	95- 00	95-100
#16	70-100	70-100
#30	40-75	40-75
#50	1 -35	20-40
#100	2-15	10-25

2.02 FLUSH GRANITE CURB

A. Granite for flush granite curb shall be engineering grade structural granite conforming to ASTM C615 requirements. Sizing of flush curb edge shall be as shown on the Drawings.

B. Granite shall be free from seams that impair its structural integrity and of smooth splitting character. Natural variations characteristic of the deposit will be permitted. Granite shall come from an approved quarry.

C. Color of granite will be selected by the Engineer from manufacturer's standard color range and shall match granite curb specified under Section 02524 CURBS, GUTTERS, AND WALKS, of the "MBTA Standard Specifications" and herein. Comply with the requirements of the National Building Granite Quarries Association, Inc. for color and finished qualities.

D. Cement mortar shall meet requirements of Section M4, Paragraph M4.02.15 of the "MHD Standard Specifications." Color shall be "natural" to match color of curb.

E. Concrete for cradle shall be 4000-psi 28-day air-entrained concrete conforming to the requirements and applicable provisions of Section M4 of the "MHD Standard Specifications" and Division 3 CONCRETE of the "MBTA Standard Specifications".

F. Gravel borrow as specified under Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications" and as specified herein.

G. Hardware shall be fabricated from steel conforming to ASTM A307 requirements and shall be stainless steel.

PART 3 - EXECUTION

3.01 ASPHALT BLOCK PAVING

A. Immediately before commencing work of laying asphalt block pavers, thoroughly clean surface to be covered with pavers of all dust, dirt and other foreign matter. Place three quarter (3/4") inch deep control bars directly over the base. The depth control bars shall be set carefully to bring the pavers, when laid, to proper grade. Engineer shall approve base course prior to any paver installation.

B. At crosswalks and along bus drop-off install flush granite curb prior to installation of paving. Engineer shall approve installation of flush granite curb prior to starting paving. In areas over tunnel install prefabricated drainage composite as shown on the Drawings.

C. Install asphalt cement setting bed over the surfaces of the bituminous concrete base course. Roll the setting bed while hot, with a power roller, to a nominal depth of three-quarters of an inch (3/4").

D. A coating of two percent (2%) neoprene-modified adhesive shall be applied by mopping, squeegeeing or trowelling over the top surface of the bituminous setting bed so as to provide a bond under the pavers. If it is troweled, the trowel shall be serrated with the serrations not to exceed one-sixteenth of an inch (1/16").

E. Layout of asphalt block paving units shall conform to the Drawings and approved Shop Drawings. Any units not conforming to the designed layout shall be removed and reset to conform to the Drawings. Adjust the elevation so that when the pavers are placed the top surface of the pavers will be at the required finished grade. All units shall be brought to indicated lines and sections by rolling or other approved method.

F. Do not lay pavers in inclement weathers, or when rain or snow is imminent.

G. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches the drainage structure.

H. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies 1/4 inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

I. Joints:

1. Joints shall be hand tight and shall read from zero to a maximum of one-sixteenth inch (1/16").
2. Sweep sand joint filler material into the joints until they are completely filled. Fog lightly with water. Repeat until all joints are completely compacted and full. Sweep pavement clean of excess sand material.

I. The Contractor shall protect the paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Engineer shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer.

3.02 FLUSH GRANITE CURB

A. Furnish and install flush granite curb straight, plumb in a concrete cradle as shown on the Drawings and in accordance with approved Shop Drawings and as specified under Section 02524 CURBS, GUTTERS, AND WALKS, of the "MBTA Standard Specifications" and herein. At crosswalks and bus drop-off areas install flush granite curb prior to installation of paving. Engineer shall approve installation of flush granite curb prior to starting paving.

B. Submit complete Shop Drawing for layout of all flush cubs indicating radius and size of all units.

C. Place curb units in accurate line, each piece butting the next with joint spacing no larger than one-quarter inch (1/4"). Final points shall be joined by closure pieces made to order. No curb shall be cut in the field. After alignment, the curb shall be carefully backfilled with concrete and processed gravel fill. Extreme care shall be taken not to disturb alignment until twenty-four (24) hours or till concrete cradle has set and cured, whichever time is longer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Asphalt block paving, complete in place, installed on bituminous concrete base courses and all materials specified herein for installation shall be measured by the square yard.

C. Flush granite curb, complete in place, including concrete cradle and all materials specified herein for installation shall be measured as specified under Section 02524 CURBS, GUTTERS, AND WALKS, herein or as specified in the "MBTA Standard Specifications".

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. Asphalt block paving, complete in place, installed on bituminous concrete base courses and all materials specified herein for installation shall be paid for at the Contract unit price per square foot for the quantities shown in the Schedule of Bid Prices, herein.

C. Flush granite curb, complete in place, shall be paid for under Section 02524 CURBS, GUTTERS, AND WALKS, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0451.020	ASPHALT BLOCK PAVING	SQUARE FOOT

END OF SECTION

SECTION 02516

CONCRETE PAVERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to install concrete pavers and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

1. Shop Drawings/Product Literature: Coordinated Shop Drawings shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas

seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and/or product literature.

B. Sample Mock-ups: Sample mock-ups of all items shall be complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work.
2. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
3. If the first samples are not approved, the Contractor shall provide additional samples until an approved sample is obtained for each of the above.
4. If approved, the sample shall become part of the final work.
5. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

C. Samples:

1. Concrete pavers: Submit a minimum of twelve (12) pavers showing color range.
2. Sand: Submit a one-quart sample for each type.

D. Shop Drawings and/or Product Literature:

1. Pavement layout - Shop Drawings.

E. Sample Panel Mock-ups:

1. Build sample panels of not less than fifty (50) square feet for the following in the areas designated by the Engineer:

a. Concrete pavers on bituminous concrete base course.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all precast concrete items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Contracting Authority satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of installation of concrete pavers shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

1.11 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Engineer to cover statutory requirements.

PART 2 - PRODUCTS

2.01 CONCRETE PAVERS

A. Concrete pavers shall match existing pavers on site removed under Section 02100 SITE PREPARATION, herein. Submit samples for approval and product literature as specified herein.

B. Bituminous concrete base course shall be as specified in Section 02513 BITUMINOUS CONCRETE PAVEMENT of the "MBTA Standard Specifications" and herein. Depth and number of courses as shown on the Drawings and as required to complete the work.

C. Gravel borrow shall be as specified in Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications". Depth of course as shown on the Drawings and as required to complete the work.

D. Prefabricated drainage composite shall be Miradrain 9000 as manufactured by Mirafi, Inc., Charlotte, NC, telephone (704) 523-7477, or approved equal. Contractor shall provide required accessories for installation.

E. Plastic edge restraints shall be PVD edging system as manufactured by Pave Tech, Inc., local distributor Pavers by Ideal (617) 894-3200, or approved equal by Oly-Ola Edgings, Inc. (800) 334-4647, or Asphalt EDGE by PermaLoc Corporation (800) 356-9660, Submit product literature for approval.

F. Asphalt cement for the bituminous setting bed shall comply with ASTM D3381 latest requirements, viscosity grade A.C.10 or A.C.20. The fine aggregate for the bituminous setting bed shall be clean, hard sand with durable particles and shall be free from adherent coating, lumps of clay, alkali salts, and organic matter. It shall be uniformly graded from "coarse" to "fine" and all passing the No. 4 sieve and comply with these gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and course aggregated ASTM C136-81. The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300° F. at an asphalt plant. The approximate proportion of materials shall be seven percent (7%) cement asphalt and ninety-three percent (93%) fine aggregate. Each ton shall be apportioned by weight in the approximate ratio of 145 pounds asphalt to 1,855 pounds sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

G. Neoprene-Modified Asphalt Adhesive shall conform to the following requirements:

MASTIC (asphalt adhesive)	
Solids (base)	75 + 1%
Lbs./Gal.	8-8.5 lb.
Solvent Varson (over 100°F. Flash)	
BASE (2% Neoprene, 10% Asbestos-free fibers, 88% Asphalt)	
Melting Point - ASTM D-36	200°F. Min.
Penetration-77°F. 100 Gram Load	
5 Second (.1 mm)	23.27
Ductility-ASTM D-113-44 @25°C	
5 cms/per minute	125 cm Min.

H. Jointing material: ASTM C144 latest requirements clean masonry sand as follows:

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4	100	100
#8	95- 00	95-100
#16	70-100	70-100
#30	40-75	40-75
#50	1 -35	20-40
#100	2-15	10-25

PART 3 - EXECUTION

3.01 CONCRETE PAVERS

A. In areas over tunnel install prefabricated drainage composite as shown on the Drawings.

B. Immediately before commencing work of laying pavers, thoroughly clean surface to be covered with pavers of all dust, dirt and other foreign matter. Place three quarter (3/4") inch deep control bars directly over the base. The depth control bars shall be set carefully to bring the pavers, when laid, to proper grade. Engineer shall approve base course prior to any paver installation.

C. Install asphalt cement setting bed over the surfaces of the bituminous concrete base course. Roll the setting bed while hot, with a power roller, to a nominal depth of three-quarters of an inch (3/4").

D. A coating of two percent (2%) neoprene-modified adhesive shall be applied by mopping, squeegeeing or trowelling over the top surface of the bituminous setting bed so as to provide a bond under the pavers. If it is troweled, the trowel shall be serrated with the serrations not to exceed one-sixteenth of an inch (1/16").

E. Layout of paving units shall conform to the Drawings and approved Shop Drawings. Install pave edge restraints at all edges. Any units not conforming to the designed layout shall be removed and reset to conform to the Drawings. Adjust the elevation so that when the pavers are placed the top surface of the pavers will be at the required finished grade. All units shall be brought to indicated lines and sections by rolling or other approved method.

F. Do not lay pavers in inclement weathers, or when rain or snow is imminent.

G. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches the drainage structure.

H. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies 1/4 inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

I. Joints:

1. Joints shall be hand tight and shall read from zero to a maximum of one-eigth inch (1/8").
2. Sweep sand joint filler material into the joints until they are completely filled. Fog lightly with water. Repeat until all joints are completely compacted and full. Sweep pavement clean of excess sand material.

J. The Contractor shall protect the paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Engineer shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Concrete pavers, complete in place, including bituminous concrete base courses and all materials specified herein for installation shall be measured by the square foot.

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. Concrete pavers, complete in place, including bituminous concrete base course and all materials specified herein for installation shall be paid for at the Contract unit price per square foot for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER.	PAYMENT ITEMS	UNIT
0426.100	PAVERS	SQUARE FOOT

END OF SECTION

SECTION 02517

TACTILE WARNING STRIP

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to install tactile warning strips and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

1. Shop Drawings/Product Literature: Coordinated Shop Drawings shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale

details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and/or product literature.

B. Sample Mock-ups: Sample mock-ups of all items shall be complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work.
2. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
3. If the first samples are not approved, the Contractor shall provide additional samples until an approved sample is obtained for each of the above.
4. If approved, the sample shall become part of the final work.
5. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

C. Samples:

1. Tactile warning strip: Submit a minimum of three units for each color selected.
2. Sand: Submit a one-quart sample for each type.

D. Shop Drawings and/or Product Literature:

1. Tactile warning strip layout - Shop Drawings.
2. Tactile warning strip - Product literature.

E. Sample Panel Mock-ups:

1. Build sample panel of pedestrian curb ramp complete with tactile warning strip pavers for the following in the areas designated by the Engineer:

   a. Tactile warning strip on bituminous concrete base course.
   b. Tactile warning strip on concrete base course.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all precast concrete items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Contracting Authority satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of installation of concrete pavers shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

1.11 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Engineer to cover statutory requirements.

PART 2 - PRODUCTS

2.01 TACTILE WARNING STRIP

A. Tactile warning strip shall be "Detectable Warning Concrete Pavers" shall be precast concrete pavers thickness three (3") inches and paver size shall be 11 3/4"x11 3/4"; all dimensions are nominal. Pavers shall be provided in two colors, "Limestone Gray" and "Natural", and shall be selected from the manufacturer's standard range of colors. They shall have a non-slip texture applied to the surface of the pavers, and shall be as manufactured by Hanover Architectural Products local representative Specifier Services, Inc. telephone (603) 669-1329 or approved equal as manufactured by Pavers by Ideal, Waltham, MA (781) 894-3200 or as manufactured by Pavestone Company local distributor Bob Cianciosi Commercial Sales Middleboro, MA. (508) 947-6001. Pavers shall meet or exceed ASTM C-936 latest requirements with a minimum compressive strength of 8,500-psi maximum absorption of 5% or less and a freeze-thaw testing per

ASTM C-67, latest edition. The Engineer shall select and approve the final color. Submit samples of each color for approval and product literature as specified herein.

B. Bituminous concrete base courses shall be as specified in Section 02513 BITUMINOUS CONCRETE PAVEMENT of the "MBTA Standard Specifications" and herein. Depth and number of courses as shown on the Drawings and as required to complete the work.

C. Cement concrete base course shall be as specified in Section 02524 CURBS, GUTTERS, AND WALKS of the "MBTA Standard Specifications". Concrete for base course, including reinforcing, shall be 4000-psi 28-day air-entrained concrete conforming to the requirements and applicable provisions of Division 3 CONCRETE of the "MBTA Standard Specifications" and herein. Depth of course as shown on the Drawings and as required to complete the work.

D. Gravel borrow shall be as specified in Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications". Depth of base course as shown on the Drawings and as required to complete the work.

E. Prefabricated drainage composite shall be Miradrain 9000 as manufactured by Mirafi, Inc., Charlotte, NC, telephone (704) 523-7477, or approved equal. Contractor shall provide required accessories for installation.

F. Asphalt cement for the bituminous setting bed shall comply with ASTM D3381 latest requirements, viscosity grade AC-10 or AC-20. The fine aggregate for the bituminous setting bed shall be clean, hard sand with durable particles and shall be free from adherent coating, lumps of clay, alkali salts, and organic matter. It shall be uniformly graded from "coarse" to "fine" and all passing the No. 4 sieve and comply with these gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and course aggregated ASTM C136-81. The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300° F. at an asphalt plant. The approximate proportion of materials shall be seven percent (7%) cement asphalt and ninety-three percent (93%) fine aggregate. Each ton shall be apportioned by weight in the approximate ratio of 145 pounds asphalt to 1,855 pounds sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

G. Neoprene-Modified Asphalt Adhesive shall conform to the following requirements:

MASTIC (asphalt adhesive)	
Solids (base)	75 + 1%
Lbs./Gal.	8-8.5 lb.
Solvent Varson (over 100°F. Flash)	
BASE (2% Neoprene, 10% Asbestos-free fibers, 88% Asphalt)	
Melting Point - ASTM D-36	200°F. Min.
Penetration-77°F. 100 Gram Load	
5 Second (.1 mm)	23.27
Ductility-ASTM D-113-44 @25°C	
5 cms/per minute	125 cm Min.

H. Jointing material: ASTM C144 latest requirements clean masonry sand as follows:

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4	100	100
#8	95- 00	95-100
#16	70-100	70-100
#30	40-75	40-75
#50	1 -35	20-40
#100	2-15	10-25

PART 3 - EXECUTION

3.01 TACTILE WARNING STRIP

A. In areas over tunnel install prefabricated drainage composite as shown on the Drawings.

B. Immediately before commencing work of laying tactile warning strips, thoroughly clean surface to be covered with pavers of all dust, dirt and other foreign matter. Place three quarter (3/4") inch deep control bars directly over the base. The depth control bars shall be set carefully to bring the pavers, when laid, to proper grade. Engineer shall approve base course prior to any paver installation.

C. Install asphalt cement setting bed over the surfaces of the bituminous concrete base course or concrete base course. Roll the setting bed while hot, with a power roller, to a nominal depth of three-quarters of an inch (3/4").

D. A coating of two percent (2%) neoprene-modified adhesive shall be applied by mopping, squeegeeing or trowelling over the top surface of the bituminous setting bed so as to provide a bond under the pavers. If it is troweled, the trowel shall be serrated with the serrations not to exceed one-sixteenth of an inch (1/16").

E. Layout of paving units shall conform to the Drawings and approved Shop Drawings. Install pave edge restraints at all edges. Any units not conforming to the designed layout shall be removed and reset to conform to the Drawings. Adjust the elevation so that when the pavers are placed the top surface of the pavers will be at the required finished grade. All units shall be brought to indicated lines and sections by rolling or other approved method.

F. Do not lay pavers in inclement weathers, or when rain or snow is imminent.

G. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches the drainage structure.

H. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies 1/4 inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

I. Joints:

1. Joints shall be hand tight and shall read from zero to a maximum of one-eigth inch (1/8").
2. Sweep sand joint filler material into the joints until they are completely filled. Fog lightly with water. Repeat until all joints are completely compacted and full. Sweep pavement clean of excess sand material.

J. The Contractor shall protect the paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Engineer shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Tactile warning strips, complete in place, installed on either a bituminous concrete base course or a concrete base course and all materials specified herein for installation shall be measured by the square foot.

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. Tactile warning strip pavers, complete in place, installed on either a bituminous concrete base course or a concrete base course and all materials specified herein for installation shall be paid for at the Contract unit price per square foot for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER.	PAYMENT ITEMS	UNIT
0263.116	TACTILE WARNING STRIP	SQUARE FOOT

END OF SECTION

SECTION 02518

INTERLOCKING CONCRETE PAVERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to install interlocking concrete pavers and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

1. Shop Drawings/Product Literature: Coordinated Shop Drawings shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas

seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and/or product literature.

B. Sample Mock-ups: Sample mock-ups of all items shall be complete in place. The quality of workmanship must be approved by the Engineer in writing before permanent construction is started.

1. If the original sample is not approved, the Contractor shall provide additional samples as required, at no cost to the Engineer, until an approved sample is obtained. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work.
2. Obtain Engineer 's written acceptance of samples before proceeding with the final work.
3. If the first samples are not approved, the Contractor shall provide additional samples until an approved sample is obtained for each of the above.
4. If approved, the sample shall become part of the final work.
5. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

C. Samples:

1. Interlocking concrete pavers: Submit a minimum of twelve (12) pavers showing color range.
2. Sand: Submit a one-quart sample for each type.

D. Shop Drawings and/or Product Literature:

1. Pavement layout - Shop Drawings.

E. Sample Panel Mock-ups:

1. Build sample panels of not less than fifty- (50) square feet for the following in the areas designated by the Engineer:
   a. Interlocking concrete pavers on sand on bituminous concrete base course.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof

covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all precast concrete items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Contracting Authority satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of installation of interlocking concrete pavers shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years

of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

1.11 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Engineer to cover statutory requirements.

PART 2 - PRODUCTS

2.01 INTERLOCKING CONCRETE PAVERS

A. Interlocking concrete pavers shall be "Uni-Stone" thickness three and one-eight (3 1/8") inch nominal size 41/2" x 9" as manufactured by Pavers by Ideal, Waltham, MA (781) 894-3200 or approved equal by Hanover Architectural Products local distributor Specifier Services, Inc. Bedford, NH (603) 669-1329 or Pavestone Company local distributor Bob Cianciosi Commercial Sales Middleboro, MA. (508) 947-6001. Paver shall meet or exceeds the latest requirements of ASTM C-936, which requires a minimum compressive strength of 8,000-psi maximum absorption of 5% and a freeze-thaw testing per section of ASTM C-67, latest requirements. Color shall be "pewter". Submit samples for approval.

B. Sand for setting bed and jointing shall be:

1. Setting bed shall be sharp, washed concrete sand consisting of clean, inert, hard, durable grains of quartz or other hard, durable rock, free from clay or loam, surface coatings, and plastic material. The material shall not contain more than 3% silt and shall be free of deleterious soluble salts. The gradation shall meet the requirements of the following range as determined by ASTM C33 requirements:

U.S. Sieve No.	Percent Passing by Weight
3/8"	100
No. 4	95-100
No. 8	70-100
No. 18	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0

2. Jointing materials shall be masonry sand with a gradation conforming to ASTM C144, latest edition.

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4 100	100	
#8	95-100	95 -00
#16	70-100	70-100
#30	40-75	40-75
#50	10-35	20-40
#100	2-15	10-25

C. Bituminous concrete base course shall be as specified in Section 02513 BITUMINOUS CONCRETE PAVEMENT of the "MBTA Standard Specifications" and herein. Depth and number of courses as shown on the Drawings and as required to complete the work.

D. Gravel borrow shall be as specified in Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications". Depth of course as shown on the Drawings and as required to complete the work.

E. Prefabricated drainage composite shall be Miradrain 9000 as manufactured by Mirafi, Inc., Charlotte, NC, telephone (704) 523-7477, or approved equal. Contractor shall provide required accessories for installation.

PART 3 - EXECUTION

3.01 INTERLOCKING CONCRETE PAVERS

A. In areas over tunnel install prefabricated drainage composite as shown on the Drawings.

B. Immediately before commencing work of laying pavers, thoroughly clean surface to be covered with pavers of all dust, dirt and other foreign matter. Engineer shall approve base course prior to any paver installation.

C. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. Around manholes, catch basin or similar structures, extra care shall be taken to compact the material in the surrounding area

within six feet (6') of the perimeter of the structure. No standing water will be allowed around or before drainage reaches the drainage structure.

D. Setting Bed:

1. The setting bed shall be spread loose and screed level by the use of screed rails and boards to a uniform thickness not to exceed 1-1/2" and conforming to the grade of the base. The exact thickness of the setting bed shall be determined at the job site on the basis of field trails to provide a uniform depth of not less than 3/4" and not greater than 1 1/4" after compaction of the paving units.
2. Care shall be taken to insure the setting bed is not disturbed or pre-compacted in any way. If the screeded sand is accidentally pre-compacted by walking or rain, rake and re-screed as above.
3. Do not screed more of an area of setting bed on which the pavers can be set that day.

E. Installation:

1. Concrete pavers shall be installed plumb, level and true to line and grade. Finished work shall conform to and align with elevations shown on the Drawings. Care shall be taken during the layout to minimize cutting.
2. Layout of paving units shall conform to the Drawings and approved Shop Drawings. Any units not conforming to the designed layout shall be removed and reset to conform to the Drawings.
3. Starting at 90° corner or straight edge, commence laying the pavers one eighth 1/8" inch from the edge restraint on the undisturbed setting bed in the pattern and color as shown on the Drawings.
4. Pavers shall be installed hand tight to achieve uniform joints approximately one eighth of an inch (1/8") wide between pavers. String lines shall be used frequently to hold pattern lines true and accurate.
5. Full units shall be laid first and cuts done subsequently. Use manufactured edge pieces or, as required, cut full units with masonry saw to fit accurately, neatly, and without damaged edges. Where cutting will result in a space less than 25% of the size of a full unit a 1:2:4 concrete mix may be used, at the discretion of the Landscape Architect.
6. Installers shall lay subsequent pavers by moving forward on the top of the previously installed units.
7. Pavers shall be taken in a random fashion from three (3) or more palettes at the same time to blend color variations.
8. Care should be taken when transporting material over uncompacted pavers to prevent damage to the pavement or premature compaction of the sand bedding.
9. After a substantial area of pavers has been installed, a plate vibrator or roller vibrator with high frequency, low amplitude shall be used to tamp the units into place and to vibrate the sand up into the joints. Three or more passes with the vibrator shall be made at 90 degrees to the other until the pavers are brought to the design levels and profiles. Compaction shall continue until lipping has been eliminated between adjoining pavers. Care shall be taken to keep three feet from the edge of the unrestrained pavers prior to completion of installation. All pavers installed during the day must be compacted by day's end.

F. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the

surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies 1/4 inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

G. Jointing:

1. Joint sand shall be spread and broomed over the installed pavers. At least one pass of the plate vibrator shall be made to consolidate the sand in the joints.
2. Remaining sand shall be swept into the joints until they are filled flush to the top of the pavers. Sweep excess sand clear from the paving surface.

K. The Contractor shall protect the precast concrete paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Owner shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Landscape Architect.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Interlocking concrete pavers, complete in place, including bituminous concrete base courses and all materials specified herein for installation shall be measured by the square foot.

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. Concrete pavers, complete in place, including bituminous concrete base course and all materials specified herein for installation shall be paid for at the Contract unit price per square foot for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER.	PAYMENT ITEMS	UNIT
0422.001	INTERLOCKING CONCRETE PAVERS	SQUARE FOOT

END OF SECTION

SECTION 02520

GRANITE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to install granite paving for granite feature strip at back of curb on bituminous concrete base and on cement concrete base and related items as indicated on the Drawings and/or as specified herein.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02509 – Subbase and Base Courses.
3. Section 02513 – Bituminous Concrete Pavement.
4. Section 02524 – Curbs, Gutters and Walks.

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. Standard Specification: Commonwealth of Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest edition.
3. AASHTO: American Association of State Highway and Transportation Officials, Standard Specifications, latest edition.
4. ASTM: American Society for Testing and Materials, latest edition.
5. ADA: Americans with Disabilities Act, latest edition and latest edition of the "Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles" of the United States Architectural and Transportation Barriers Compliance Board.
6. AAB: Architectural Access Board, Commonwealth of Massachusetts Regulation Chapter 521 CMR, latest edition.
7. OSHA: Occupational Safety Hazard Administration, latest requirements.
8. National Building Granite Quarries Association, Inc. latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Coordinated Shop Drawings shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and/or product literature.

1. Granite paving layout - Shop Drawings.

C. Sample Mock-ups: Sample mock-up for integral color imprinted concrete pavement shall be complete in place. The Engineer in writing must approve the quality of workmanship before permanent construction is started.

1. Build sample panels of not less than one hundred and fifty (150) square feet for the following in the areas designated by the Engineer:
   a. Granite on bituminous concrete base set on dry pack.
   b. Granite on concrete base set on dry pack.
2. The approved sample shall become the standard for the entire job. The samples can be constructed at a location that will become part of the work.
3. Obtain Engineer 's written acceptance of sample (s) before proceeding with the final work.
4. If the first samples are not approved, the Contractor shall provide additional samples until an approved sample is obtained.
5. If approved, the sample shall become part of the final work.
6. Schedule samples so that samples can be accepted a minimum of 30 days prior to installation represented by the samples.

D. Samples: Submit representative samples to Engineer for selection and approval, as follows. Do not order materials until Engineer's approval has been obtained. Delivered materials shall closely match the approved samples.

1. Granite: Submit a minimum of one- (1) samples granite with correct dimensions and surface finishes.
2. Sand: Submit a one-quart sample for each type.
3. Dry pack: Submit a one-quart sample.

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water and wind.

B. Take all necessary precautions to prevent all items from chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the site. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred therefrom.

C. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as

required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of installation of granite paving shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

1.11 ACCESSIBILITY CODES

A. From time to time there are changes made in the federal and /or state accessibility and /or building codes or it is determined that different codes are applicable to a site. Such determinations or changes may occur during the course of the construction of this project. If changes become necessary to meet codes a change order shall be issued by the Engineer to cover statutory requirements.

PART 2 - PRODUCTS

2.01 GRANITE PAVING

A. Bituminous concrete base courses shall be as specified in Section 02513 BITUMINOUS CONCRETE PAVEMENT of the "MBTA Standard Specifications" and herein. Depth and number of courses as shown on the Drawings and as required to complete the work.

B. Cement concrete base course shall be as specified in Section 02524 CURBS, GUTTERS, AND WALKS of the "MBTA Standard Specifications". Concrete for base course, including reinforcing, shall be 4000-psi 28-day air-entrained concrete conforming to the requirements and applicable provisions of Division 3 CONCRETE of the "MBTA Standard Specifications" and herein. Depth of course as shown on the Drawings and as required to complete the work.

C. Gravel borrow shall be as specified in Section 02509 SUBBASE AND BASE COURSES of the "MBTA Standard Specifications" and herein.

D. All granite material shall have characteristics and physical requirements as defined in the latest requirements of ASTM C119 and C165, and shall posses physical characteristics (Table 1) as specified under ASTM C615, in accordance with the latest requirements of the following ASTM test references:

1. Abrasion resistance of stone, subject to foot traffic: ASTM C241.
2. Absorption of natural building stone: ASTM C97.
3. Compressive strength of natural building stone: ASTM C170.
4. Modulus of rupture of natural building stone: ASTM C99.

E. Granite shall be free from seams, which impair its structural integrity and shall be of smooth splitting character. Natural variations characteristic of the deposit will be permitted. Color of granite will be selected by the Engineer from manufacturer's standard color range and shall match granite curb specified under Section 02524 CURBS, GUTTERS, AND WALKS, of the "MBTA Standard Specifications" and herein. Comply with the requirements of the National Building Granite Quarries Association, Inc. for color and finished qualities.

F. Pavers shall be fabricated to size and thickness as shown on the Drawings. Top surface of all pavers shall be sawn with a thermal finish. All edges and bottom shall be sawn. Thickness of stone shall be provided in two thicknesses two and one-quarter (2 1/4") inches and three (3") inches as shown on the Drawings.

G. Sand/cement setting bed (dry pack) for granite paving only shall be one part cement and three parts sand by volume, mixed dry until the mass is a uniform color. Do not use this material for joints.

1. Cement for dry pack shall be Type 2 Portland Cement, meeting the requirements of ASTM C150.
2. Sand shall comply with ASTM C33 latest requirements:

U.S. Sieve No.	Percent Passing by Weight
3/8"	100
#4	95 to 100
#8	80 to 100
#16	50 to 85
#30	25 to 60
#50	10 to 30
#100	2 to 10
#200	---

G. Jointing material: ASTM C144 latest requirements clean masonry sand as follows:

U.S. Sieve No.	Percent Passing by Weight	
	Natural Sand	Manufactured Sand
3/8"	---	---
#4	100	100
#8	95- 00	95-100

#16	70-100	70-100
#30	40-75	40-75
#50	1 -35	20-40
#100	2-15	10-25

H. Prefabricated drainage composite shall be Miradrain 9000 as manufactured by Mirafi, Inc., Charlotte, NC, telephone (704) 523-7477, or approved equal. Contractor shall provide required accessories for installation.

PART 3 - EXECUTION

3.01 GRANITE PAVING

A. In areas over tunnel install prefabricated drainage composite as shown on the Drawings.

B. Immediately before commencing work of laying pavers, thoroughly clean surface to be covered with pavers of all dust, dirt and other foreign matter. Base course shall be approved by Engineer prior to any paver installation.

C. Granite Paving on Dry-pack:

1. Install dry pack setting bed over the surface of the bituminous concrete or cement concrete base course.
2. The setting bed shall be spread loose and screed level by the use of screed rails and boards to a uniform thickness not to exceed 1-1/2" and conforming to the grade of the base. The exact thickness of the setting bed shall be determined at the job site on the basis of field trails to provide a uniform depth of not less than 3/4" and not greater than 1" after compaction of the paving units.
3. Care shall be taken to insure the setting bed is not disturbed or pre-compacted in any way. If the screeded dry pack setting bed is accidentally pre-compacted by walking or rain, rake and re-screed as above.
4. Do not screed more of an area of setting bed on which the pavers can be set that day.
5. Adjust the elevation so that when the pavers are placed the top surface of the pavers will be at the required finished grade. All units shall be brought to indicated lines and sections by rolling or other approved method.
6. Do not lay pavers in inclement weathers, or when rain or snow is immanent. Do not lay asphalt pavers when the ambient temperature is below 36° F.
7. Joints shall be hand tight and shall read from zero to maximum one-sixteenth inch (1/16") for granite. Sweep dry sand joint filler material into the joints until they are completely filled. Repeat until all joints are completely compacted and full. Sweep pavement clean of excess sand material. **No cement shall be used in the jointing material.**

D. Layout of paving units shall conform to the Drawings and approved Shop Drawings. Any units not conforming to the designed layout shall be removed and reset to conform to the Drawings. Adjust the elevation so that when the pavers are placed the top surface of the pavers will be at the required finished grade. All units shall be brought to indicated lines and sections by rolling or other approved method.

E. Do not lay pavers in inclement weathers, or when rain or snow is imminent.

F. Check for correct elevation and position of any manhole covers, grates and similar structures located within the areas to be paved. If the elevations are not correct the Contractor shall make any necessary adjustments of the structures to bring them to the correct grade shown on the Drawings. No standing water will be allowed around or before drainage reaches the drainage structure.

G. All paving shall be checked with a ten-foot (10') straightedge. The straightedge shall be held in successive positions parallel to the direction of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularity in the finished surface, which varies 1/4 inch from a true surface, shall be corrected. Adequate and approved straightedges shall be furnished and used by this Contractor. The Contractor shall provide or designate a competent employee whose duty shall be to carefully use the straightedge to check the finished compacted surfaces.

H. Joints:

1. Joints shall be hand tight and shall read from zero to a maximum of one-sixteenth inch (1/16").
2. Sweep sand joint filler material into the joints until they are completely filled. Fog lightly with water. Repeat until all joints are completely compacted and full. Sweep pavement clean of excess sand material.

I. The Contractor shall protect the paving against public traffic and the traffic caused by his/her own employees and agents. Any paving units damaged by traffic or other causes occurring prior to its final acceptance in writing by the Engineer shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Gravel borrow shall be measured as specified under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications."

B. Granite feature strip paving, complete in place, installed on either a bituminous concrete base course or a concrete base course and all materials specified herein for installation shall be measured by the square foot.

4.02 PAYMENT

A. Gravel borrow shall be paid for under Section 02509 SUBBASE AND BASE COURSES, herein or as specified in the "MBTA Standard Specifications" for the quantities shown in the Schedule of Bid Prices, herein.

B. Granite feature strip paving, complete in place, installed on either a bituminous concrete base course or concrete base course and all materials specified herein for installation shall

be paid for at the Contract unit price per square foot for the quantities shown in the Schedule of Bid Prices, herein.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0450.118	GRANITE FEATURE STRIPS	SQUARE FOOT

END OF SECTION

SECTION 02524

CURBS, GUTTERS AND WALKS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the construction of portland cement concrete walks, pedestrian ramps and granite curbs in accordance with Standard Specifications Construction Section 02524, except as modified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete: 4000-3/4, Section 03310

D. Gravel Borrow: Type C, Section 02200

E. Granite Curb: Type VA4, Massachusetts Highway Department, Materials Specification Section M9, Articles M9.04.0, M9.04.1, M9.04.5 and M9.04.6.

PART 3 - EXECUTION

3.02 JOINTS

A. Expansion Joints

1. Expansion joints will be provided and installed where new concrete sidewalks abut existing structures or features that project through or into concrete walks. Concrete sidewalks will be placed in alternate slabs approximately 30 feet in length based on sidewalk scoring pattern detail, except as otherwise directed or permitted. The slabs will be separated by self-expanding cork expansion joint filler 3/8 inch in thickness. Expansion joints will also be provided at other locations as the Engineer may direct. Expansion joints need not be placed between sidewalks and granite curbing.

2. Expansion joint filler is to be fitted tightly and neatly around each structure. Around lighting and utility poles, the Contractor will install the joint filler so as to allow for a breakaway section around the pole.

3. Expansion joints will be provided at abutting structures, at all castings and at protruding structures having an area greater than 30 square inches.

4. Self-expanding cork joint filler will be factory wrapped in moisture proof paper and shipment made in substantial wooden crates to prevent hydration or damage in transit and while stored prior to installation.

5. Care must be taken to avoid removal of the factory wrapping more than 24 hours prior to the time it is placed in position in the joint, or if conditions are such that excessive moisture is present and in contact with the cork, it must not be unwrapped more than four (4) hours prior to placing in the joint. Self-expanding cork shall not be exposed to rain or excessive air moisture after it is unwrapped either prior to or during installation.

6. It is not recommended that cutting or fabricating from a slab be attempted at the job site.

7. An asphaltic or waterproof type cement may be used to adhere the self-expanding cork to concrete or structures on one surface of the cork only.

B. Contraction (Control) Joints

1. Contraction joints in sidewalks shall be as directed by the Engineer.

2. Contraction joints may be formed by cutting a slot in the concrete not less than 1/4 of the depth with a minimum depth of 1-1/2 inches. The slot may in some cases be cut by a T-bar forced into the fresh concrete and edged with a jointer held against a straightedge to make a clean, straight joint. The joint shall have a 3/4-inch bit.

3. The slot shall be cut with an electric or gasoline driven power saw fitted with an abrasive or diamond blade. Joints so made shall be cut no sooner than four (4) hours nor later than twelve (12) hours after the slab has been placed and finished. Cutting of joints must not be done before the concrete is firm enough not to be torn by the blade, but must be done before random shrinkage cracks can form in the concrete slab. Joints that are cut with a saw need not be tooled.

4. It is intended that contraction joints, in general, on sidewalks more than seven (7) feet in width, shall be cut with a saw, except on curves and at other locations where it is impractical to saw cut. The location of joints formed by a T-bar shall be subject to the approval of the Engineer.

5. The Contractor shall submit to the Engineer for approval, prior to construction, a complete scoring and jointing plan for all concrete sidewalks showing the pattern and his intent at features such as tree pits, light bases, pull boxes, hydrants and other related items.

3.05 GRANITE CURBS

A. Construct granite curbs as indicated and as specified in accordance with the Massachusetts Highway Department, Standard Specifications Section 501; Curb, Curb Inlets, Curb Corners and Edging and MHD Drawing Number 106.3.0, Method of Setting Vertical Curb.

B. Construct flush granite curbs as indicated by the details in the Contract Documents.

3.06 GRANITE CURBING: REMOVED AND RESET

A. Remove and reset granite curbing in accordance with Section 580 of theMassachusetts Highway Standard Specifications for Highways and Bridges and in accordance with the details shown on the contract drawings.

B. New granite curbing shall be used to replace existing curbing that is unsuitable for reuse. New granite curb with mortar joints shall be installed in accordance with Section 500 of the Massachusetts Highway Standard Specifications for Highways and Bridges and in accordance with the details shown on the contract drawings

3.07 PEDESTRIAN RAMPS

A. Construct pedestrian ramps, including granite curb, in accordance with the City of Boston details shown on the plans.

3.08 CONCRETE SIDEWALKS

A. The quantity of concrete being mixed in a mixer shall be no less than 40 percent of the capacity of the mixing drum, a minimum of three (3) yards in a seven (7) yard truck, and shall always be in full yard increments. After adding all dry ingredients, the truck hopper and fins shall be washed with at least ten (10) gallons of water and mixed for a minimum of fifteen (15) minutes. Concrete mix control shall be such as to provide good batch-to-batch uniformity. The slump of the concrete should be consistent throughout the project and no water should be added after a portion of the batch has been discharged. Concrete, which has started to set, shall not be retempered but must be discarded.

B. Concrete for sidewalks shall be placed in one (1) course to the depths indicated on the Contract Drawings.

C. Structures such as pull boxes, light bases, hydrants, traffic controls, sign posts and other such appurtenances shall be completely installed before the concrete is placed; water gates, gas gates and other such appurtenances shall be brought to grade; and tree pits shall be excavated and backfilled with loam to the same grade as the top of the gravel base.

D. Before the concrete is placed, the subgrade shall be thoroughly dampened so that it is moist throughout, but without puddles of water. Precaution shall be taken not to overwork the concrete while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeds to eliminate voids or honeycombs at the edges. No finishing operations shall be delayed until all bled water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has disappeared, edging operations, where required, shall be completed.

E. Forms shall be smooth, free from warp, of sufficient strength to resist springing out of shape and of depth to conform to the thickness of the proposed sidewalk. Forms shall be joined neatly and tightly, shall be set true to line and grade, well stacked and braced, and shall have uniform bearing on the foundation throughout their entire length. Mortar and deleterious materials shall be completely removed from forms that have been previously used. The forms shall be thoroughly clean and painted with oil before concrete is placed against them and shall be made sufficiently tight to prevent the leaking of mortar from the concrete.

F. Forms shall not be removed for 24 hours after the concrete has been placed, or for a longer period if directed by the Engineer. Extreme care shall be taken in removing forms in order that not to damage the concrete. Under no condition shall any bar, pick or tool be used which depends upon leverage on the concrete for removal of the forms.

G. After the forms have been removed, all holes or honeycombs shall be promptly patched with mortar of the same composition as that used for the sidewalk pavement, which has been allowed to set for about 1/2 hour after mixing.

H. The concrete shall be tooled at form edges, along the edgestone, adjacent to utility covers and at other obstructions. After edging and jointing operations, the surface shall be floated with a wood, aluminum or magnesium float. Immediately following floating, the surface shall be steel troweled.

I. Concrete surfaces to which curing compound has been applied shall be protected for a period of at least three (3) days. Vehicular and pedestrian traffic is considered injurious to the film of applied compound. Since it will probably be impossible to completely restrict walking on the dried film, any damage to the film shall be promptly repaired by reapplication of the compound.

J. Adequate protection shall be provided where temperature of 40 degrees Fahrenheit or lower occur during placing of concrete, and during the early curing period. The minimum temperature of fresh concrete after placing, and for the first four (4) days, shall be maintained about 55 degrees Fahrenheit. In addition to the above requirements, an additional three (3) days of protection from freezing shall be maintained when required.

K. The granite curb at all street intersections will be installed with concrete supports.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

D. Sidewalks, including island paving, and driveways will be measured by the square yard of each thickness.

E. Concrete setting bed for granite curbing shall not be measured separately and shall be considered incidental to the installation of the granite curbing.

F. Tactile strips and dowels for the construction of the pedestrian ramps shall not be measured separately and shall be considered incidental to the construction of the pedestrian ramps.

4.02 PAYMENT

A. Curbs, gutters, and walks will be paid for at the Contract unit prices for the quantities determined as specified above.

B. Granite curbing – removed and reset will be paid for at a contract unit price per lineal foot basis, including removal, stacking, storing and resetting complete in place including bedding materials and incidentals.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0211.610	PEDESTRIAN RAMP	SY
0262.214	GRANITE CURB, TYPE VA4, STRAIGHT	LF
0262.215	GRANITE CURB, TYPE VA4, CURVED	LF
0262.227	GRANITE CURB INLETS, TYPE VA4, STRAIGHT	EA
0262.249	STRAIGHT GRANITE TRANSITION CURB FOR PEDESTRIAN RAMPS	LF
0262.250	CURVED GRANITE TRANSITION CURB FOR PEDESTRIAN RAMPS	LF
0262.701	CURBING – REMOVE AND RESET	LF
0263.150	CONCRETE SIDEWALKS	SY
0263.151	CONCRETE DRIVEWAY	SY

END OF SECTION

SECTION 02577

PAVEMENT MARKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and application of reflectorized pavement markings in accordance with Standard Specification Construction Section 02577, except as modified herein.

B. Removal of existing and temporary pavement markings is specified in Section 01570.

1.02 SUBMITTALS

B. Submit manufacturer's product data/catalog cuts for interim pavement marking material and permanent pavement marking material.

C. Submit manufacturer's application instructions for interim pavement marking material and permanent pavement marking material.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall be in accordance with the Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highways and Bridges (MHD Standard Specifications).

B. Interim Pavement Marking Material

1. Interim pavement marking material shall be an acrylic type, low VOC, fast drying water-borne traffic paint conforming to MHD Standard Specifications, Section M7, and the following.

   a. White: Subsection M7.01.23.

   b. Yellow: Subsection M7.01.24.

C. Permanent Pavement Marking Material

1. Permanent pavement marking material shall be thermoplastic reflectorized pavement markings conforming to MHD Standard Specifications, Section M7, and the following.

   a. White: Subsection M7.01.03.

   b. Yellow: Subsection M7.01.04.

D. Glass beads

1. Glass beads shall conform to MHD Standard Specifications, Section M7, Subsection M7.01.07.

2. Glass beads shall be applied to interim pavement marking material and permanent pavement marking material.

PART 3 - EXECUTION

3.03 APPLICATION OF MARKINGS

A. Apply pavement markings as follows:

Material	Material Application Temperature (°F)	Line Thickness (mils)	Reflectorized Bead Application
M7.01.03	400-425	125-190	1 lb./10 SF drop on
M7.01.04	400-425	125-190	1 lb./10 SF drop on
M7.01.23	40-120	15	6 lb./gal.
M7.01.24	40-120	15	6 lb./gal.

3.05 INTERIM PAVEMENT MARKINGS

A. Install and maintain interim pavement markings as shown on the traffic management plan and as specified in Section 01570.

B. When pavement markings are removed in the course of roadway excavation work, immediately restore markings after excavated area is repaved.

C. Refer to Section 01570 for additional requirements, regarding the removal of pavement markings and application of new interim pavement markings as construction progresses from stage to stage.

3.06 PERMANENT PAVEMENT MARKINGS

A. After final paving work is completed, install permanent pavement markings where indicated on the Drawings.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. 4" Pavement Markings will be measured by the linear foot for interim and permanent pavement markings furnished and installed, with glass beads, complete in place.

B. Crosswalks and stoplines will be measured by the square foot for interim and permanent pavement markings furnished and installed, with glass beads, complete in place.

C. Removal of existing and temporary pavement markings shall be measured by the square foot.

4.02 PAYMENT ITEMS

Item No.	Item Description	Unit
1040.707	REFLECTORIZED WHITE LINE CROSSWALKS AND STOP	SF

1040.738	4" REFLECTORIZED THERMOPLASTIC WHITE LINE	LF
1040.920	PAVEMENT MARKING REMOVAL	SF
1042.053	TEMPORARY 4" PAVEMENT MARKINGS (PAINTED)	LF

END OF SECTION

SECTION 02650

EXISTING SITE UTILITIES

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies the maintenance, support, protection, relocation, reconstruction, adjustment to grade, restoration and abandonment of existing utilities affected by the construction work in accordance with Standard Specification Section 02650, except as modified herein.

B. The Contractor shall study the contract documents carefully and anticipate relocation of any and all existing utilities or removal of abandoned utilities that will hinder the construction of the proposed utilities. Relocation of existing utilities, due to construction of proposed utilities, will be considered incidental to the items of work to which they pertain.

1.02 SUBMITTALS

F. Brochures and catalog cuts.

1.03 NOTIFICATION AND COORDINATION

A. Notify the appropriate utility company or City of Boston agency and the Engineer in writing at least two weeks prior to starting any work involving existing utility facilities.

B. The Contractor shall be responsible for the necessary coordination and cooperation with the utility companies and the City of Boston agencies involved in the work specified herein.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02453 Traffic Signals

G. Section 02457 Traffic Signs

H. Section 02651 Electric Facilities Relocation

I. Section 02652 Gas Facilities Relocation

J. Section 02653 Telephone Facilities Relocation

K. Section 02654 Fire Alarm Facilities Relocation

L. Section 02713 Exterior Water Distribution Systems

M. Section 02800 Exterior Conduit Systems

N. Section 03200 Concrete Reinforcement

O. Section 03310 Portland Cement Concrete

P. Section 05920 Corrosion Control

Q. Section 02296 Traffic Decking

PART 2 – PRODUCTS

2.03 CONCRETE

A. Concrete shall be 4000 psi, ¾ inch aggregate, conforming to the requirements of Standard Specification Section 03310.

2.04 GRAVEL

A. Gravel borrow for backfill shall conform to the requirements of Standard Specification Section 02200.

PART 3 – EXECUTION

3.01 GENERAL

C. Abandoned Facilities

4. Utility structures abandoned shall be in accordance with the standards of the utility owners.

5. Remove and stack Boston Water and Sewer Commission (BW&SC) gate valves, butterfly valves and castings on structures to be abandoned to an area designated by the Engineer and notify the BW&SC for pick up. Dispose of stacked materials not picked up by the BW&SC.

G. The trench left by the new work shall be backfilled in conformance with the requirements of Standard Specification Section 02200. The disturbed surface shall be restored to its original condition.

3.03 RECONSTRUCTION AND ADJUSTMENT-TO-GRADE

C. When the line or grade, or both the line and grade of the storm drain and/or sanitary sewer structure requires a change of six inches or less, the structure shall be adjusted to line and grade. The masonry shall be removed to such a depth as directed by the Engineer and new masonry shall be constructed to conform to the proposed design and in conformity with the requirements of the Boston Water and Sewer Commission standard details.

D. When the line or grade, or both the line and grade of the storm drain and/or sanitary sewer structure requires a change greater than six inches, the structure shall be remodeled. The sloped and vertical masonry shall be removed to such depths as directed by the Engineer and new masonry or precast units shall be constructed to conform to the proposed design and in conformity with the requirements of the Boston Water and Sewer Commission standard details.

3.04 CLEANING PIPES, CATCH BASINS AND MANHOLES

A. Clean existing pipes, catch basins and manholes by a method approved by the Engineer at locations indicated on the Contract Documents or as directed by the Engineer.

3.05 ELECTRIC AND TELEPHONE UTILITY STRUCTURES ABANDONED, ADJUSTED, REMOVED AND STACKED, REMOVED AND RESET, REMODELED AND REBUILT

A. Comply with the requirements of the utility owners that takes precedence in all cases, with these Specifications, as indicated on the Contract Documents and as directed by the Engineer.

B. Utility structures abandoned shall be in accordance with the Standards of the utility owners. Dispose of stacked materials not picked up by the owners.

C. When the line or grade, or both the line and grade of the utility structure require a change to the casting, the utility structure shall be adjusted to line and grade. The masonry shall be removed to such a depth as directed by the Engineer and new masonry shall be constructed to conform to the proposed design. NStar Electric shall adjust their utility structures.

D. Utility structures remodeled consists of removing and stacking the existing casting, removing and disposing of the existing structure roof, raising the walls with cast in place concrete to the proposed elevation, constructing a cast in place structure roof in accordance with the utility companies standards and resetting the existing casting.

E. Utility structures rebuilt consists of removing and stacking, for owner pick up, the existing casting, removing and disposing of the existing structure while not damaging any material that is required to remain, breakout of existing ducts/conduit and concrete as required, installing split pvc conduit and concrete around existing cables as required, constructing a new utility structure of the size stated in the same location and installing a new structure casting.

F. The trench left by the new work shall be backfilled in conformance with Standard Specification Section 02200. The disturbed surface shall be restored to its original conditions.

3.06 UTILITY STRUCTURES REMOVED AND STACKED AND REMOVED AND RESET

A. Utility structures, which include pipe and any other items to be removed and stacked or reset, shall be in close conformity with the lines and grades indicated on the Contract Documents or as established by the Engineer. Excavation to a sufficient width and depth shall be completed so that the present structure can be removed without damage. Pipe joints shall be opened and pipe removed in its original sectional lengths. Existing structures in good condition, which are damaged in removing or other handling due to carelessness of the Contractor, shall be replaced with a new structure at the Contractor's expense. The construction methods for resetting structures in its final location shall conform to the applicable provisions of Standard Specification Section 02400. The Contractor shall accept and hold entire responsibility for the removal, handling, stacking at a location designated by the Engineer and protection of all utility structures until the final removal by their owners. Any structure lost or damaged

through lack of protection or carelessness by the Contractor shall be replaced with a satisfactory structure accepted by the Engineer at the Contractor's expense. The Contractor's responsibility shall cease upon final acceptance of the work or 60 days from the time a certified notice, with a copy to the Engineer, is sent by the Contractor to the owners that all material is available for removal.

B. The trench left by the new work shall be backfilled in conformance with Standard Specification Section 02200. The disturbed surface shall be restored to its original conditions.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Utility structures, catch basins, manholes, hydrants, water service boxes (water shut offs), gate boxes, gas valve boxes (gas shut offs), utility poles and light poles abandoned, adjusted, remodeled, removed and stacked, removed and reset and rebuilt shall be measured per each complete including excavation, backfilling, disposal of excess excavated materials, compaction, concrete, concrete reinforcement, hardware, ground rods, bonding wire, frame and cover, permanent and temporary patch, and all necessary and incidental work as specified and/or as directed by the Engineer.

B. Catch basins and/or storm drain and sanitary sewer manholes abandoned or adjusted outside the station shall be measured per each complete and accepted including all excavation, backfilling, disposal of excess excavated materials, compaction, hardware, concrete, permanent or temporary patch, and all necessary and incidental work as specified and/or as directed by the Engineer.

C. Catch basins and/or storm drain and sanitary sewer manholes remodeled outside the station shall be measured per vertical lineal foot actually reconstructed, complete and accepted in place, including all excavation, backfilling, disposal of excess excavated materials, compaction, hardware, concrete, permanent or temporary patch, and all necessary and incidental work as specified and/or as directed by the Engineer.

D. Rock excavation encountered during performance of the work specified in this Section shall be separately measured and paid for as specified in Standard Specification Section 02200.

E. Cleaning existing pipes, regardless of size, as indicated on the Contract Documents and/or as directed by the Engineer, shall be measured by the lineal foot.

F. Cleaning existing catch basins and/or manholes, regardless of size, as indicated on the Contract Documents and/or as directed by the Engineer, shall be measured per each.

G. Neither measurement nor payment shall be made for cleaning pipes, catch basins and manholes installed and constructed by the Contractor and/or due to Contractor's acts or negligence.

H. Backfill materials specified as borrow shall be measured and paid for as specified in Standard Specification Section 02200.

I. Gate valves and boxes and/or butterfly valves and boxes, removed and stacked, shall be measured per each complete including excavation, backfilling, disposal of excess excavated materials, compaction, permanent or temporary patch, hardware and all necessary and incidental work as specified and/or as directed by the Engineer.

J. Utility poles, utility poles with lights and street light poles and luminaries removed and stacked shall be measured per each complete including excavation, backfilling, disposal of excess excavated materials, compaction, permanent or temporary patch, hardware and all necessary and incidental work as specified and/or as directed by the Engineer.

K. Handholes, pull boxes and water meter boxes abandoned or adjusted to grade shall not be separately measured and paid for but all work shall be considered incidental to the utility work to which they pertain.

4.02 PAYMENT

A. Payment for the work specified in this Section shall be made at the Contract unit prices for the quantities determined as specified herein.

B. No separate measurement of payment will be made for demolishing and removing abandoned utility facilities in conflict with the work. All costs in connection therewith will be considered incidental to the item/ items of work to which they pertain.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0222.520	CATCH BASIN OR MANHOLE ABANDONED	EA
0250.010	CLEANING PIPE	LF
0250.015	CLEAN CATCH BASINS AND MANHOLES	EA
0250.118	CATCH BASIN OR MANHOLE ADJUSTED	EA
1519.400	WATER SERVICE BOXES ADJUSTED TO LINE AND/OR GRADE	EA
1519.500	GATE BOXES ADJUSTED TO LINE AND/OR GRADE	EA
1519.510	GATE AND GATE BOX – REMOVE AND STACK	EA
1520.107	6" GATE AND GATE BOX – REMOVE AND RESET	EA
1520.600	BUTTERFLY VALVE AND BOX - REMOVE AND STACK	EA
1550.100	HYDRANTS – REMOVE AND RESET	EA
1621.114	TELEPHONE MANHOLE ADJUSTED	EA

- END OF SECTION -

SECTION 02651

ELECTRIC FACILITIES RELOCATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing products and materials required for the temporary relocation and permanent reconstruction of NSTAR Gas & Electric Corporation (NStar Electric) electric facilities affected by this Contract in accordance with Standard Specification Section 02650, NStar Electric's "Transmission and Distribution Department, Standards and Procedures, Code 19, Underground Contractors (Manhole & Conduit) and Chapter 7 Conduits and Manholes" and as specified herein.

B. In the event the Contractor chooses to subcontract the electric work under this Section, any subcontractor shall be approved by NStar Electric in writing prior to the Contractor submitting any such subcontractor to the Authority for approval. If the Contractor shall choose not to subcontract the electrical work under this Section, it shall obtain written approval from NStar Electric concerning its suitability to perform the electrical work.

C. The Contractor shall notify NStar Electric in writing at least two (2) weeks prior to starting any work on electrical facilities of NStar Electric, or to be constructed for use by NStar Electric. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. Coordinate all aspects of the electrical work with:

Mr. David Amann
NSTAR Gas & Electric Corporation
Summit, One NSTAR Way
Westwood, MA 02090
781-441-8123

D. The Contractor shall request all temporary and permanent street lighting connections through Mr. David Amann, NStar Electric, 781-441-8123.

E. The Contractor shall be responsible for obtaining all NStar Electric standard plates and specifications specified in these specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02453 Traffic Signals

G. Section 02650 Existing Site Utilities

H. Section 02652 Gas Facilities Relocation

I. Section 02653 Telephone Facilities Relocation

J. Section 02654 Fire Alarm Facilities Relocation

K. Section02713 Exterior Water Distribution Systems

L. Section 02800 Exterior Conduit Systems

M. Section 03100 Concrete Formwork

N. Section 03200 Concrete Reinforcement

O. Section 03310 Portland Cement Concrete

P. Section 03400 Precast Concrete

Q. Section 04200 Unit Masonry

R. Section 05500 Miscellaneous Metal

S. Section 05920 Corrosion Control

T. Section 16050 Basic Materials and Methods for Electric Work

1.03 INSPECTION

A. Work inspection specified in this Section will be made by NStar Electric and by the Authority.

1.04 SUBMITTALS

A. Brochures and catalog cuts.

B. Certificates of compliance for manholes, conduits and hardware.

C. Samples of all units along with certified engineering data. Upon approval of the samples and test data, delivery of the units shall be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

1.05 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.06 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.07 NSTAR ELECTRIC ALLOWANCE

A. The NStar Electric's responsibilities included in the allowance are the following:

1. Supply all labor and equipment for:

   a. Pulling and splicing of all cables

   b. Setting all electric poles

   c. Adjusting existing electric manhole castings to grade

   d. Inspection of all construction by the Contractor relating to the NStar Electric

2. Supply all of the following materials:

   a. Cable

   b. Electric poles

   c. Transformers

   d. Any other materials required to complete the work

3. Supply all labor, equipment and materials for service connections from the customer's structure to the customer's property line.

B. The Contractor's responsibility, not included in NStar Electric's allowance, is to supply all labor, equipment and materials for:

1. The installation of all of NStar Electric's concrete encased conduits, duct banks and cast in place and precast manholes.

2. The installation of all service conduits from the electric manholes or poles to the customer's property line, street light control boxes and/or service boxes.

3. Coordination with NStar Electric.

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials and products shall be new and conform to the requirements of NStar Electric's "Transmission and Distribution Department, Standards and Procedures, Code 19, Underground Contractors (Manhole & Conduit) and Chapter 7 Conduits and Manholes" and these specifications.

2.02 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall be as indicated in the contract documents, NStar Electric Standards and as specified in Standard Specifications Section 03200.

2.03 CONCRETE

A. Concrete shall be 4000 psi, ¾ inch aggregate as specified in Standard Specifications Section 03310.

2.04 MANHOLES

A. Electric Manhole Frame and Cover: NStar Electric Standard Plate No. 2.10-6.17.

B. Cable racks, pulling irons and sump grating for manholes: NStar Electric Standards.

C. NStar Electric shall accomplish adjusting of castings on NStar Electric manholes.

2.05 DUCTS AND CONDUITS

A. Standard Specifications Section 02800.

2.06 BACKFILL

A. Backfill shall conform to Standard Specifications Section 02200 for gravel borrow Type C.

PART 3 – EXECUTION

3.01 GENERAL

A. The sequencing of temporary relocation and final reconstruction of manholes, ducts, conduits and appurtenances shall be in accordance with indicated staging plans.

B. City of Boston streets shall be opened by excavation in accordance with the relevant provisions of NStar Electric's Standard Section 2.10-1A.

C. City of Boston street opening permits shall be required for all areas outside of the MBTA construction easement. No work in any of these areas shall be undertaken until the required permits have been acquired. Work shall be undertaken at the time and under the conditions of the rights and permits granted by the City of Boston.

D. Public roadways and sidewalks damaged by the work of the Contractor shall be repaired as required and as directed at no additional cost to the Authority. Other damaged areas shall be backfilled with suitable material and compacted to elevations compatible with its surroundings in a manner that will provide for proper drainage.

3.02 EXCAVATION AND BACKFILL

A. Trench and manhole excavation and backfill shall be performed in accordance with Standard Specification Section 02200.

3.03 GROUNDING

A. NStar Electric standards.

3.04 UTILITY STRUCTURES ABANDONED AND ADJUSTED

A. Comply with the requirements of NStar Electric, which takes precedence in all cases, with these Specifications, as indicated on the contract documents and as directed by the Engineer.

B. Electric manholes to be abandoned shall be accomplished in accordance with the Standards of NStar Electric.

C. When the line or grade, or both the line and grade of the utility structure requires a change to the casting, the utility structure shall be adjusted to line and grade. The masonry shall be removed to such a depth, as directed by the Engineer, and new masonry shall be constructed to conform to the proposed design. NStar electric shall adjust their utility structures.

3.05 ELECTRIC MANHOLES

A. In each new electric manhole, at a convenient point close to the wall, a one inch by ten foot copper clad steel ground rod shall be driven into the earth before the floor is poured so that approximately six inches of the ground rod will extend above the manhole floor. Ground rods outside the manhole shall extend approximately six inches above the manhole. The ground rods shall be interconnected by a 4/0 AWG bare tinned copper stranded conductor installed around the walls of the manhole as indicated on the contract documents. Ground rods may be sectionalized into two (2) five foot sections for ease of driving.

3.06 PLACING DUCTS AND CONDUITS

A. Standard Specification Section 02800.

3.07 ENTERING NSTAR ELECTRIC MANHOLES

A. The Contractor shall not enter any existing NStar Electric manholes. The installation of conduit into existing NStar Electric manholes shall be done by an NStar Electric authorized Contractor under NStar Electric's supervision. Conduit running to the existing NStar Electric manholes will be terminated by the Contractor outside the manhole walls at a distance and location acceptable to NStar Electric.

Breaking the manhole walls, attaching a sleeve to the conduit and forming a bell mouth in the manhole, and installing the cable from the existing manhole will be accomplished by an NStar Electric authorized Contractor.

B. The Contractor shall be responsible for payment of any charges made by NStar Electric for which no direct compensation will be made to the Contractor; it being agreed and understood that full compensation for these charges will be included in the allowance for NStar Electric. Contractor service connection charges are not part of the allowance and will be paid for by the Contractor.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Manholes, cast in place and precast, will be measured by each type constructed or abandoned, complete in place, including all concrete, reinforcement, hardware, ground rods, bonding wire, frame and cover, appurtenances (including but not necessarily limited to cable racks, pulling irons and sump grating), excavation, backfilling, compaction, disposal of excess excavated materials, permanent or temporary patch, and all incidentals.

B. Rock excavation encountered during performance of the work specified in this Section will be separately measured for payment as specified in Section 02200.

C. Conduits and ducts will be measured and paid for as specified in Section 02800.

4.02 PAYMENT

A. Payment for electric facility relocation will be made at the Contract unit prices for the items as specified herein.

B. Allowance will be made to reimburse the Contractor for work and materials performed and supplied by NStar Electric for electric utility relocation work as specified in Section 01020.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0211.482	ELECTRIC SERVICE RELOCATION	AL
1621.098	ELECTRIC MANHOLE 5' X 10' X 7'	EA

- END OF SECTION -

SECTION 02652

GAS FACILITIES RELOCATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing products and materials required for the temporary relocation and permanent reconstruction of KeySpan Energy Delivery (KED) gas facilities affected by this Contract in accordance with Standard Specification Section 02650; KeySpan Energy Delivery's applicable requirements of "General Directions and Specifications for Installing Gas Distribution Mains"; Commonwealth of Massachusetts, Department of Public Utilities, "Gas Distribution Code 11725", latest edition; U.S. Department of Transportation, "Regulations for the Transportation of Natural and Other Gas by Pipeline"; Applicable Requirements of the Occupational Safety and Health Act of 1970 and as specified herein.

B. In the event the Contractor chooses to subcontract the gas work under this Section, any subcontractor shall be approved by KED in writing prior to the Contractor submitting any such subcontractor to the Authority for approval. If the Contractor shall choose not to subcontract the gas work under this Section, it shall obtain written approval from KED concerning its suitability to perform the gas work.

C. The Contractor shall notify KED in writing at least two (2) weeks prior to starting any work on gas facilities of KED, or to be constructed for use by KED. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. This will cover the necessary compliance with Chapter 82, Section 40 of the Massachusetts General Laws as amended in Chapter 502 (1980). Coordinate all aspects of the gas work with:

Mr. Michael P. Manning
KeySpan Energy Delivery
52 Second Avenue
Waltham, MA 02451
781-466-5373

D. Excavation for any underground work shall not commence unless KED has been currently advised and has located its facilities at the work site.

E. The Contractor shall be responsible for obtaining all KED standards and specifications specified in these specifications. Appendix A includes a sample of the available KED standards and specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02650 Existing Site Utilities

G. Section 02651 Electric Facilities Relocation

H. Section 02653 Telephone Facilities Relocation

I. Section 02654 Fire Alarm Facilities Relocation

J. Section 02713 Exterior Water Distribution Systems

K. Section 02800 Exterior Conduit Systems

L. Section 03100 Concrete Formwork

M. Section 03200 Concrete Reinforcement

N. Section 03310 Portland Cement Concrete

O. Section 05500 Miscellaneous Metal

P. Section 05920 Corrosion Control

Q. Section 15050 Basic Materials and Methods for Mechanical Work

1.03 INSPECTION

A. Work inspection specified in this Section will be made by KED and by the Authority. All construction work will be subject to supervision by a KED representative.

1.04 SUBMITTALS

A. Brochures and catalog cuts.

B. Certificates of compliance and shop drawings for all pipeline materials.

C. Samples of all units along with certified engineering data. Upon approval of the samples and test data, delivery of the units shall be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

1.05 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.06 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects

in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.07 KED ALLOWANCE

A. The KED's responsibilities included in the allowance are the following:

1. Supply all labor, equipment and materials for:

   a. Installation of all temporary and permanent gas mains, tie-ins and connections.

   b. Capping all live mains including necessary material.

   c. Inspection of all gas line construction by the Contractor, field sketching, engineering, plotting and x-ray of welds.

   d. Installation of all temporary and permanent gas services, tie-ins, connections and gas meter. The gas meter will be located adjacent to and behind the elevator shaft.

   e. Installation of material for corrosion control and for cathodic protection.

   f. Installation and compaction of sand, supplied by the Contractor, around the haunch area and to six (6) above the proposed or temporary gas line.

   g. Installation of tracing wire and warning tape prior to backfilling by the Contractor.

B. The Contractor's responsibility, not included in KED's allowance, includes:

1. Supply all labor, equipment and materials for:

   a. Installation of all gas mains, services and appurtenances, except those installed by KED.

   b. Installation of a permanent gas service line from the gas meter to within five feet of the MBTA Blue Line structure above the emergency generator room.

c. Assist KED in the installation of all permanent and temporary gas mains, services, tie-ins and connections. This includes but not necessarily limited to: trench excavation backfill and compaction; furnishing, installing and compacting 6" sand bedding.

d. Furnishing of sand for KED to place and compact around and above the proposed permanent and temporary gas line.

e. Coordination with KED.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Coated pipe: Conform to the requirements KED Standard No. 200-2.

PART 2 – PRODUCTS

2.01 PIPE

A. All steel pipe and coatings: Conform to KED Standard Nos. 200-7, 200-8 and API-5L, latest edition.

B. Pipe size O.D. ¾ inch to three inches: Butt welded electric furnace, Class I, Class II or Bessemer Grade; minimum yield strength 25,000 psi; minimum tensile strength 45,000 psi.

C. Pipe size O.D. four inches to 36 inches: Seamless or electric welded Grade B, minimum yield strength 35,000 psi, minimum tensile strength 60,000 psi.

D. Pipe ends: Beveled for welding, coating cut back shall be six inches.

E. Minimum allowable wall thickness:

Pipe Size (Inches)	Minimum Wall Thickness (Inches)
¾ - 1	0.113
2	0.154
3	0.216
4	0.219

2.02 WELDED ELLS

A. Long radius steel welding ells – 45 and 90 degrees: ASTM A234, latest edition.

2.03 WELDED END CAPS AND REDUCERS

A. Welded end caps and steel butt-weld concentric reducers: Standard weight conforming to ASTM A234, latest edition.

2.04 COUPLINGS

A. Couplings for steel pipe: "Dresser" or an approved equivalent conforming to ANSI 150, latest edition.

B. Gaskets, other than insulating, shall be "Armored" type.

C. Three inch Style 39-62, Type I, shall have a middle ring twelve inches long. Four inch through ten inch Style 39-62, Type I, shall have a middle ring seven inches long. Couplings to have a full boot insulator and separate pipe end spacer.

D. All couplings shall be ordered with a factory applied "ALCLAD" coating or an approved equal.

2.05 CORROSION CONTROL AND CATHODIC PROTECTION

A. Material for corrosion control and cathodic protection for steel gas pipes: In accordance with KED Operations Standard Nos. 200-2 (Sections 1, 2 and 3) and 200-7.

B. Pipe coating: Four inch and smaller – Skotchcoat or an approved equivalent.

C. Field applied coating for welded joints: 35 mils flexible polymer film and synthetic elastomeric coating with release paper; dialectic strength 12KV minimum; tensile strength 450 psi; manufactured by Protectowrap, Tapecoat, Polyken 930-35 or an approved equivalent. Use brush coat applied pipeline primer specifically designed for use under the tape procured.

D. Mastic for field coating of irregular surfaces and miscellaneous fittings shall be one part solvent drying coating containing coal tar, or an approved equivalent, incorporated into a blend with inert resins and fillers; manufactured by TC Mastic by Tapecoat, Thick & Quick Mastic by Utility Projects, Roskote Mastic A-51 by Royston Labs or an approved equivalent. The primer shall be a brush-applied primer specifically designed for this type mastic.

E. Insulating wall sleeves shall be watertight, nonconducting sleeve with an insulating modular seal conforming to Standard Specification Section 15050.

F. Electric insulators shall be union or flange type with dielectric insulating materials conforming to Standard Specification Section 15050.

2.06 WELDING RODS

A. Welding rods shall conform to American Petroleum Institute (API) Standard 1104, latest edition, and KED's Qualified Welding Procedure MGUP-1.

2.07 BACKFILL

A. Backfill shall conform to Standard Specification Section 02200 for gravel borrow Type B and KED's "General Directions and Specifications for Installing Gas Mains".

2.08 SAND BORROW

A. Clean, inert, hard, durable grains of quartz or other hard durable rock, free from loam, clay, surface coatings, or other deleterious materials; having not more than 10 percent passing a No. 200 sieve, with a maximum particle size of ¼ inch.

PART 3 – EXECUTION

3.01 GENERAL

A. The sequencing of temporary relocation and final reconstruction of gas pipe lines and appurtenances shall be in accordance with the approved CPM construction plan and as approved by KED.

B. Maintain all service connections during construction as required by KED.

C. Unloading, stockpiling and inspection of coated pipe shall be in accordance with KED's Standard No. 200-4.

3.02 EXCAVATION AND BACKFILL

A. Test pits, trench excavation, backfill and compaction for gas pipe and appurtenances shall be in accordance with Standard Specifications Section 02200 and KED's "General Directions and Specifications for Installing Gas Mains".

3.03 INSTALLATION

A. Installation of gas mains and appurtenances by the Contractor shall be in accordance with KED's "General Directions and Specifications for Installing Gas Mains" and the Commonwealth of Massachusetts, Department of Public Utilities (DPU), Gas Distribution Code 11725, latest edition.

B. Perform welding by certified pipe welders. Welding shall be in accordance with KED's Standard No. 500-13 Qualified Welding Procedure MGUP-1 and the American Petroleum Institute's Standard for Welding Pipe Lines and Related Facilities.

C. Corrosion Control and Cathodic Protection

1. Install and apply corrosion control and cathodic protection material and devices in accordance with KED Operations Standards Nos. 200-2 (Sections 1, 2, and 3) and 200-7.

2. Permanent gas pipe, reducers, tees, elbows and couplings shall have corrosion control and cathodic protection materials.

D. The Contractor shall obtain street opening permits for gas facilities work by the Contractor and KED in city streets not under temporary easement to the MBTA. Absolutely no work in public right of way, outside of the MBTA temporary easement, shall be undertaken until permits are required.

E. Street opening permits will not be required for gas facilities work by the Contractor and KED in public right of way within areas under MBTA temporary easement.

F. Perform work at such times under such conditions as may be prescribed in the terms and conditions of the rights and permits granted by the City of Boston.

G. Gas main pipe and appurtenances shall have a minimum of three (3) feet of cover below finish grade. The trench width shall be a minimum of 18 inches wide.

3.04 TESTING

A. Welds shall be radiographically tested, as selected by KED on a random basis, in accordance with Section 101.06I of the Commonwealth of Massachusetts, Department of Public Utilities (DPU), Gas Distribution Code 11725, latest edition. Make repairs to the satisfaction of KED's representative.

B. Gas facilities shall be tested in accordance with the relevant provisions of Section 7.0 of KED's "General Directions and Specifications for Installing Gas Distribution Mains", and the DPU Gas

Distribution Code 11725, latest edition. Tests shall be done to the satisfaction of the Engineer and KED's representative.

C. KED corrosion department personnel shall test insulating couplings prior to backfilling.

3.05 FIELD APPLIED COATING

A. Field coat welded joints with cold applied tape approximately 35 mils thick. Apply tape after a brush coat of an approved suitable pipeline primer.

B. Irregular surfaces and miscellaneous fittings shall have a field coat of mastic applied directly, approximately 20 mils, wet over a brush-applied primer.

3.06 PUBLIC FACILITIES

A. Public roadways and sidewalks damaged by the work of the Contractor shall be repaired as required and/or as directed by the Engineer. Other damaged areas shall be backfilled with suitable material and compacted to elevations compatible with its surroundings in a manner that will provide for proper drainage.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Pipe and pipe fittings will be measured by the lineal foot, complete in place, and the quantity to be paid for will be the length actually constructed and accepted. For measurement purposes, the ends of the pipe shall be considered the points at which the centerline of new pipe meets the centerline of existing pipe and for tees, where the centerline of a branch intersects the centerline of the main section. Measurement shall be along the centerline of the top of the pipe.

B. Frames and covers for gas gates, gas drips and test stations requiring adjustment shall be measured by count of the number actually adjusted and accepted.

C. Rock excavation shall be measured and paid for as specified in Standard Specification Section 02200 for Class B Rock Excavation.

D. Trench excavation, backfill and compaction in support of KED's furnishing and installing of temporary and permanent gas lines will be measured by the cubic yard.

E. Furnishing, installing and compacting sand borrow in support of KED's furnishing and installing of temporary and permanent gas lines will be measured by the cubic yard.

4.02 PAYMENT

A. Steel pipe and steel pipe fittings shall be paid for at the Contract unit price per lineal foot for the size specified, including but not necessarily limited to welding, excavation, backfilling, compaction, disposal of excess excavated materials, sand borrow, anodes, insulating wall sleeves, electric insulators, shoring, dewatering, testing, corrosion and cathodic protection, supporting and protecting existing utilities, and restoring facilities destroyed or damaged during construction.

B. Payment for test pits, pavement repairs and sidewalk repair shall be made under the appropriate items in Standard Specification Sections 02200, 02509, 02513 and 02524.

C. Adjustment of frames and covers for gas gates, gas drips and test stations shall be paid for at the Contract unit price each, for each valve box (frame and cover) adjusted.

D. Allowance shall be made to reimburse the Contractor for work and materials performed and supplied by KeySpan Energy Delivery for gas utility relocation work as specified in Standard Specification Section 01020.

E. Trench excavation, backfill and compaction in support of KED's furnishing and installing of temporary and permanent gas lines shall be paid for at the Contract unit price per cubic yard measured in place and accepted.

F. Furnishing, installing and compacting sand borrow in support of KED's furnishing and installing of temporary and permanent gas lines shall be paid for at the Contract unit price per cubic yard measured in place and accepted.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0211.486	GAS UTILITY RELOCATION	AL
0222.005	TRENCH EXCAVATION AND BACKFILL	CY
0222.498	SAND BORROW	CY
1521.151	4" COATED STEEL GAS PIPE	LF
1521.357	ADJUST GAS VALVE BOX	EA

– END OF SECTION –

S10CN04
2004

GAS FACILITIES RELOCATION
02652-9

KEYSPAN ENERGY DELIVERY SPECIFICATIONS FOR TRENCHING AND BACKFILLING PROVIDED BY OTHER(S) THAN KEYSPAN ENERGY DELIVERY, IN A PRIVATE DEVELOPMENT OR PRIVATE LAND

DMIM HARRIS
DEC 1 1 2003
JOB NO.

PLEASE NOTE: RECEIPT OF THIS FORM WILL INITIATE PROJECT SCHEDULING

TRENCH DEPTH

1. MAINS-the trench shall be deep enough to provide 36 inches of cover from finished grade to top of main. For all services and gas mains, on private property, 24 inches of cover is required.

TRENCH WIDTH

2. The trench shall be at least 18 inches wide, unless otherwise specified by KeySpan Distribution Department personnel. The spoil should be at least 24 inches from the edge of the trench. (O.S.H.A.)

TRENCH OFFSET

3. The trench shall be laid out so as to provide a minimum offset of 36 inches from other utilities. Where practical, gas mains should be on the opposite side of the street from the water main.

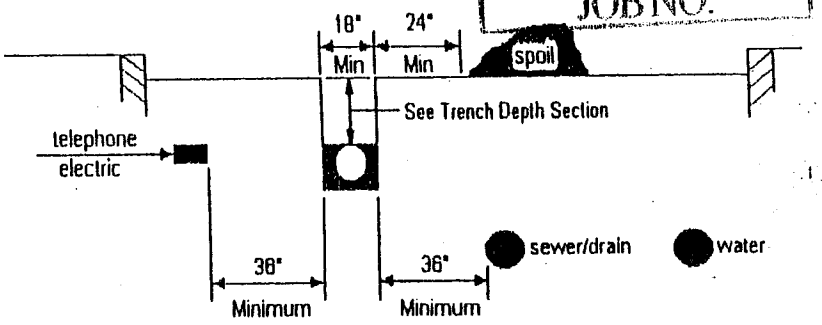
TRENCH PADDING

4. The natural bottom of the trench shall be padded with 6 inches of sand. Also, sufficient sand must be provided for a minimum of 6 inches of cover above the gas main.
Sand shall be provided by the excavator and must be on site prior to installation of pipe.

PRE-CONSTRUCTION MEETING

5. No trenching shall be started until an on site meeting has been held between excavating contractor and KeySpan personnel. Prior to the meeting, the contractor must notify Dig Safe of the proposed work.
The following shall be confirmed at the meeting:

A. Route of trench.
B. Tentative start date



Call Dig Safe: 1-888-344-7233
Allow 72 Hours Before Excavating

INSTALLATION OF GAS MAIN & SERVICE

Once KeySpan has installed the main and services, KeySpan will cover the pipe with 6 inches of sand and install the tracing wire and warning tape prior to backfilling.
The excavating contractor shall be responsible for proper compacting of the trench and maintaining all surface (valve) boxes prior to and during on-site paving.

* If this work is to take place outside of the normal construction season (March through November), off site tie-ins on city streets shall be done subject to KeySpan crew availability and the issuance of required permits.

APPENDIX A

TO BE FILLED IN BY THE EXCAVATING CONTRACTOR

Job Location: _____ Work Order # : _____ Dig Safe # : _____

Job Site Contact Person : _____ Phone # : _____ Start Date : _____

SECTION 02653

TELEPHONE FACILITIES RELOCATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing products and materials required for the temporary relocation and permanent reconstruction of Verizon telephone facilities affected by this Contract in accordance with Standard Specification Section 02650, Verizon Standard System Practices and as specified herein.

B. In the event the Contractor chooses to subcontract the telephone work under this Section, any subcontractor shall be approved by Verizon in writing prior to the Contractor submitting any such subcontractor to the Authority for approval. If the Contractor shall choose not to subcontract the telephone work under this Section, it shall obtain written approval from Verizon concerning its suitability to perform the telephone work.

C. The Contractor shall notify Verizon in writing at least two (2) weeks prior to starting any work on telephone facilities of Verizon, or to be constructed for use by Verizon. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. Coordinate all aspects of the telephone work with:

Mr. John Donnelly
Verizon
459 Main Street
Saugus, MA 01906
781-941-7987

D. The Contractor shall be responsible for obtaining all Verizon standards and specifications specified in these specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02650 Existing Site Utilities

G. Section 02651 Electric Facilities Relocation

H. Section 02652 Gas Facilities Relocation

I. Section 02654 Fire Alarm Facilities Relocation

J. Section 02713 Exterior Water Distribution Systems

K. Section 02800 Exterior Conduit Systems

L. Section 03100 Concrete Formwork

M. Section 03200 Concrete Reinforcement

N. Section 03310 Portland Cement Concrete

O. Section 03400 Precast Concrete

P. Section 04200 Unit Masonry

Q. Section 05500 Miscellaneous Metal

R. Section 05920 Corrosion Control

S. Section 16050 Basic Materials and Methods for Electric Work

1.03 INSPECTION

A. Work inspection specified in this Section will be made by Verizon and by the Authority.

1.04 SUBMITTALS

A. Brochures and catalog cuts.

B. Certificates of compliance for manholes, conduits and hardware.

C. Samples of all units along with certified engineering data. Upon approval of the samples and test data, delivery of the units shall be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

1.05 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.06 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor.

Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.07 VERIZON ALLOWANCE

A. Verizon's responsibilities included in the allowance are the following:

1. Supply all labor and equipment for:

   a. Pulling and splicing of all cables

   b. Inspection of all construction by the Contractor relating to Verizon

2. Supply all of the following materials:

   a. Cable

   b. Any other materials required to complete the work

3. Supply all labor, equipment and materials for service connections from the customer's structure to the customer's property line.

B. The Contractor's responsibility, not included in Verizon's allowance, is to supply all labor, equipment and materials for:

1. The installation of all of Verizon's concrete encased conduits, duct banks and cast in place and precast manholes.

2. The installation of all service conduits from the telephone manholes or poles to the customer's property line.

3. Coordination with Verizon.

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials and products shall be new and conform to the requirements of Verizon's construction standards and specifications, and these specifications.

2.02 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall be as indicated in the contract documents, Verizon's Standards and as specified in Standard Specifications Section 03200.

2.03 CONCRETE

A. Concrete shall be 4000 psi, ¾ inch aggregate as specified in Standard Specifications Section 03310.

2.04 MANHOLES

A. Telephone Manhole Frame and Cover: Verizon Standards.

B. Cable racks, pulling irons, sump grating and ladders for manholes: Verizon Standards.

C. Precast Telephone Manhole: Verizon Standards.

2.05 DUCTS AND CONDUITS

A. Standard Specifications Section 02800.

2.06 BACKFILL

A. Backfill shall conform to Standard Specifications Section 02200 for gravel borrow Type C.

PART 3 – EXECUTION

3.01 GENERAL

A. The sequencing of temporary relocation and final reconstruction of manholes, ducts, conduits and appurtenances shall be in accordance with indicated staging plans.

B. City of Boston streets shall be opened by excavation in accordance with the relevant provisions of Verizon's Standards.

C. City of Boston street opening permits shall be required for all areas outside of the MBTA construction easement. No work in any of these areas shall be undertaken until the required permits have been acquired. Work shall be undertaken at the time and under the conditions of the rights and permits granted by the City of Boston.

D. Public roadways and sidewalks damaged by the work of the Contractor shall be repaired as required and as directed at no additional cost to the Authority. Other damaged areas shall be backfilled with suitable material and compacted to elevations compatible with its surroundings in a manner that will provide for proper drainage.

3.02 EXCAVATION AND BACKFILL

A. Trench and manhole excavation and backfill shall be performed in accordance with Standard Specification Section 02200.

3.03 UTILITY STRUCTURES ABANDONED AND ADJUSTED

A. Comply with the requirements of Verizon, which takes precedence in all cases, with these Specifications, as indicated on the contract documents and as directed by the Engineer.

B. Telephone manholes to be abandoned shall be accomplished in accordance with the Standards of Verizon.

C. When the line or grade, or both the line and grade of the utility structure requires a change to the casting, the utility structure shall be adjusted to line and grade. The masonry shall be removed to such a depth, as directed by the Engineer, and new masonry shall be constructed to conform to the proposed design.

3.04 TELEPHONE MANHOLES

A. Manholes, cast in place and precast, sealing of manhole walls at conduit entrances and equipping manholes shall be accomplished in accordance with Verizon standards and specifications.

3.05 PLACING DUCTS AND CONDUITS

A. Standard Specification Section 02800.

3.06 ENTERING VERIZON TELEPHONE MANHOLES

A. The Contractor shall secure the necessary permission from Verizon to break into their existing manholes and shall give the necessary notification to Verizon in order that an inspector will be present at the time of the work. The installation of conduit into Verizon manholes shall be in strict accordance with the requirements and procedures of Verizon.

B. The Contractor shall be responsible for payment of any charges made by Verizon for which no direct compensation will be made to the Contractor; it being agreed and understood that full compensation for these charges will be included in the allowance for Verizon. Contractor service connection charges are not part of the allowance and will be paid for by the Contractor.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Manholes, cast in place and precast, will be measured by each type constructed or abandoned, complete in place, including all concrete, reinforcement, hardware, ground rods, bonding wire, frame and cover, appurtenances (including but not necessarily limited to cable racks, pulling irons, sump grating and ladders), excavation, backfilling, compaction, disposal of excess excavated materials, permanent or temporary patch, and all incidentals.

B. Rock excavation encountered during performance of the work specified in this Section will be separately measured for payment as specified in Standard Specification Section 02200.

C. Conduits and ducts will be measured and paid for as specified in Standard Specification Section 02800.

4.02 PAYMENT

A. Payment for telephone facility relocation will be made at the Contract unit prices for the items as specified herein.

B. Allowance will be made to reimburse the Contractor for work and materials performed and supplied by Verizon for telephone utility relocation work as specified in Standard Specification Section 01020.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0211.488	TELEPHONE RELOCATION	AL
1651.056	TELEPHONE MANHOLE 38Y4046-1 TYPE A	EA

- END OF SECTION -

SECTION 02654

FIRE ALARM FACILITIES RELOCATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing products and materials required for the temporary relocation and permanent reconstruction of City of Boston fire alarm facilities affected by this Contract in accordance with Standard Specification Section 02650, City of Boston Fire Department standards and specifications, and as specified herein.

B. In the event the Contractor chooses to subcontract the fire alarm work under this Section, any subcontractor shall be approved by the City of Boston Fire Department in writing prior to the Contractor submitting any such subcontractor to the Authority for approval. If the Contractor shall choose not to subcontract the fire alarm work under this Section, it shall obtain written approval from City of Boston Fire department concerning its suitability to perform the fire alarm work.

C. The Contractor shall notify the City of Boston Fire Department in writing at least two (2) weeks prior to starting any work on fire alarm facilities of the City of Boston Fire Department, or to be constructed for use by the City of Boston Fire Department. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. Coordinate all aspects of the fire alarm work with Verizon and with:

Joseph Lawler
City of Boston Fire Department
Fire Alarm Division
500 Fenway
Boston, MA 02115
617-343-2898

D. The Contractor shall be responsible for obtaining all City of Boston Fire Department standards and specifications specified in these specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02650 Existing Site Utilities

G. Section 02651 Electric Facilities Relocation

H. Section 02652 Gas Facilities relocation

I. Section 02713 Exterior Water Distribution Systems

J. Section 02800 Exterior Conduit Systems

K. Section 03100 Concrete Formwork

L. Section 03200 Concrete Reinforcement

M. Section 03310 Portland Cement Concrete

N. Section 03400 Precast Concrete

O. Section 04200 Unit Masonry

P. Section 05500 Miscellaneous Metal

Q. Section 16650 Corrosion Control

R. Section 16050 Basic Materials and Methods for Electric Work

1.03 INSPECTION

A. Work inspection specified in this Section will be made by the City of Boston Fire Department and by the Authority.

1.04 SUBMITTALS

A. Brochures and catalog cuts.

B. Certificates of compliance for conduits and hardware.

C. Samples of all units along with certified engineering data. Upon approval of the samples and test data, delivery of the units shall be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

1.05 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.06 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the

Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.07 BOSTON FIRE DEPARTMENT ALLOWANCE

A. The City of Boston Fire Department's responsibilities included in the allowance are the following:

1. Supply all labor and equipment for:

   a. Pulling and splicing of all cables

   b. Engineering and inspection of all construction by the Contractor relating to the City of Boston Fire Department

B. The Contractor's responsibility, included in the allowance, is to purchase the following materials for the City of Boston Fire Department. Materials purchased shall be delivered to Headquarters, City of Boston Fire Department, Fire Alarm Machine Shop, 115 Southampton Street, Roxbury, MA 02118. The Contractor shall be reimbursed from the allowance being provided to the City of Boston Fire Department.

Description	Quantity
IMSA Spec. 29-3, Spec 14-2, Conductor Parallel Red VPC-Rural C Cable	150 ft. (Est.)

C. The Contractor's responsibility, not included in the City of Boston Fire Department's allowance, is to supply all labor, equipment and materials for:

1. The installation of the entire City of Boston Fire Department's concrete encased conduits and fire alarm boxes.

2. Coordination with the City of Boston Fire Department and Verizon.

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials and products shall be new and conform to the requirements of the City of Boston Fire Department, Fire Alarm Division, construction standards and specifications, and these specifications.

2.02 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall be as indicated in the contract documents, City of Boston Fire Department's Standards and as specified in Standard Specifications Section 03200.

2.03 CONCRETE

A. Concrete shall be 4000 psi, ¾ inch aggregate as specified in Standard Specifications Section 03310.

2.04 DUCTS AND CONDUITS

A. Standard Specifications Section 02800.

2.05 BACKFILL

A. Backfill shall conform to Standard Specifications Section 02200 for gravel borrow Type C.

2.06 CABLE

A. Polyethylene insulated, polyethylene – belted, polyvinyl chloride jacketed signal cables shall conform to the International Municipal Signal Association, Inc. Specifications No. 19-5, latest edition, and City of Boston Fire Department, Fire Alarm Division, Specifications No. FA-5007-7610, latest edition.

PART 3 – EXECUTION

3.01 GENERAL

A. The sequencing of temporary relocation and final reconstruction of ducts, conduits and appurtenances shall be in accordance with indicated staging plans.

B. City of Boston street opening permits shall be required for all areas outside of the MBTA construction easement. No work in any of these areas shall be undertaken until the required permits have been acquired. Work shall be undertaken at the time and under the conditions of the rights and permits granted by the City of Boston.

C. Public roadways and sidewalks damaged by the work of the Contractor shall be repaired as required and as directed at no additional cost to the Authority. Other damaged areas shall be backfilled with suitable material and compacted to elevations compatible with its surroundings in a manner that will provide for proper drainage.

3.02 EXCAVATION AND BACKFILL

A. Trench and excavation and backfill shall be performed in accordance with Standard Specification Section 02200.

3.03 PLACING DUCTS AND CONDUITS

A. Standard Specification Sections 02800 and 16050.

B. The installation of fire alarm conduits into Verizon manholes shall be in accordance with Verizon standard practices.

C. Fire alarm conduit shall be furnished and installed to a minimum depth of 30 inches below final roadway grade and 36 inches below final sidewalk grade. All conduits for this work must be new PVC conduit measuring four inches inside diameter. Long sweep bends and pipes shall be free from kinks and dents and shall be symmetrical in shape. All conduits shall be left clean and free from any obstruction and all burrs must be removed from the inside of all conduits. Joints must be squarely butted. All ends left exposed must be properly plugged.

D. The Contractor shall notify the City of Boston Fire Department in writing following the installation of fire alarm conduits and ducts. The City of Boston Fire department shall be solely responsible for the installation of the station service fire alarm cable including pulling and splicing.

3.04 ENTERING VERIZON TELEPHONE MANHOLES

A. The Contractor shall secure the necessary permission from Verizon to break into their existing manholes and shall give the necessary notification to Verizon in order that an inspector will be present at the time of the work. The installation of conduit into Verizon manholes shall be in strict accordance with the requirements and procedures of Verizon.

B. The Contractor shall be responsible for payment of any charges made by Verizon for which no direct compensation will be made to the Contractor; it being agreed and understood that full compensation for these charges will be included in the allowance for Verizon.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Rock excavation encountered during performance of the work specified in this Section will be separately measured for payment as specified in Standard Specification Section 02200.

B. Fire alarm conduits will be measured and paid for as specified in Standard Specification Section 02800.

4.02 PAYMENT

A. Payment for fire alarm facility relocation will be made at the Contract unit prices for the quantities determined as specified herein.

B. Allowance will be made to reimburse the Contractor for work and materials performed and supplied by the City of Boston Fire Department for fire alarm facility relocation work as specified in Standard Specification Section 01020.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0211.489	CITY OF BOSTON FIRE DEPT. UTILITY RELOCATION	AL

- END OF SECTION -

SECTION 02713

EXTERIOR WATER DISTRIBUTION SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing, installing, insulating, testing and disinfecting permanent water supply systems, fire protection mains, distribution piping and temporary by-pass piping in accordance Standard Specification Section 02713, except as modified herein.

B. New water services and systems to be installed shall be in accordance with the standards, details and specifications of the Boston Water and Sewer Commission (BW&SC) and with the details indicated on the Contract Documents.

C. The Contractor shall notify BW&SC in writing at least two (2) weeks prior to starting any work on the water distribution facilities of the BW&SC, or to be constructed for use by the BW&SC. Notification shall outline the scope of work in the entire contract area, indicating the date and location of the first excavation. Coordinate all aspects of the water distribution work with:

Mr. Stephan Shea, P.E.
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7425

Mr. Philip E. Larocque, P.E.
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7205

D. The Contractor shall be responsible for obtaining all BW&SC standard details and specifications specified in these specifications.

1.03 SUBMITTALS

D. Brochures and catalog cuts.

E. Certificates of compliance.

F. Samples of all units, along with certified engineering data. Upon approval of the samples and test data, delivery of the units will be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

G. The Contractor shall submit to the Engineer for his approval, a clear, concise construction sequence schedule minimizing the shut off time of water service in the area. The Contractor shall perform all necessary operations during the time of minimum consumer usage.

1.05 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02650 Existing Site Utilities

G. Section 02651 Electric Facilities Relocation

H. Section 02652 Gas Facilities Relocation

I. Section 02653 Telephone Facilities Relocation

J. Section 02654 Fire Alarm Facilities Relocation

K. Section 02800 Exterior Conduit Systems

L. Section 03100 Concrete Formwork

M. Section 03200 Concrete Reinforcement

N. Section 03310 Portland Cement Concrete

O. Section 05500 Miscellaneous Metal

P. Section 05920 Corrosion Control

Q. Section 15050 Basic Materials and Methods for Mechanical Work

R. Section 15250 Insulation and Section 300 MHD Standard Specifications

1.06 INSPECTION

A. Work inspection specified in this Section will be made by BW&SC and by the Authority.

1.07 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.08 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

1.09 BW&SC ALLOWANCE

A. The BW&SC responsibilities included in the allowance are the following:

1. Supply all labor and equipment for inspection of all construction by the Contractor relating to BW&SC.

B. The Contractor's responsibility, not included in BW&SC's allowance, is to supply all labor, equipment and materials for:

1. The installation of all of the MBTA's and BW&SC's water supply systems, fire protection mains and distribution piping.

2. Coordination with the BW&SC.

1.10 AS-BUILT PLANS

A. Upon completion of the work, the Contractor shall submit to the Boston Water and Sewer Commission as-built Mylar drawings and an AutoCAD release 14 disk of the entire sanitary sewer, storm drain and water main work performed by the Contractor. These drawings must include:

1. Locations of any and all abandoned items, such as pipes, water gates and manholes.

2. Locations of all new installations, such as gates, manholes, reducers, 3-way tees, bends and other appurtenances.

3. Tie-in measurements from all new items to property lines and corners.

4. Profile of all sewer and drain lines. Invert elevations of all sewer and drain lines at the manholes.

5. Depth of water pipe at all gates, bends and connections.

6. Size and type of all pipes, valves and hydrants installed.

7. Rim elevations of all manholes.

1.11 TEMPORARY BY-PASS SYSTEM

A. The Contractor shall furnish, install, test, disinfect, maintain and remove the temporary by-pass piping system in accordance with BW&SC Standard Specification Section C8.

PART 2 – PRODUCTS

2.01 PIPE

A. Ductile Iron Pipe: AWWA C151, latest edition, thickness class 52 for four inch through 18 inch pipes; double thickness cement mortar lined, AWWA C104, latest edition; with restrained joints.

2.02 FITTINGS

A. Fittings for pipe sizes four inch through 24 inch shall be ductile iron, restrained joint, having a pressure rating of 350 psi in accordance with all applicable requirements of AWWA C110, latest edition. Double thickness cement mortar lining in accordance with AWWA C104, latest edition.

D. Pipes up to 12-inch diameter shall be connected, proposed to existing, with all-purpose solid sleeves with mechanical joints.

2.05 FIRE HYDRANTS

A. BW&SC standards, details and specifications.

2.06 SERVICE CONNECTIONS

A. As required by the BW&SC and in accordance with BW&SC's standards, details and specifications.

2.07 THRUST BLOCKS AND PIPE ENCASEMENT

A. Standard Specification Section 03310, class 4,000 psi, 1-1/2 inch aggregate concrete.

2.08 REINFORCING STEEL

A. Standard Specification Section 03200, ASTM A615, Grade 40.

2.09 TYPE K COPPER WATER LINE

A. Standard Specification Section 15050.

2.10 MATERIALS

A. All materials shall be new and shall conform to the current BW&SC standards, details and specifications.

2.11 BACKFILL

A. Standard Specification Section 02200.

2.12 INSULATION

A. MHD Standard Specification Section 300.

2.13 TEMPORARY BY-PASS SYSTEM

A. Pipe: ASTM A 795, latest edition, galvanized steel, Schedule 40, with square cut grooved ends.

B. Fittings: Galvanized malleable iron with square cut grooved ends.

C. Couplings:

1. Provide couplings designed for use with grooved pipe, galvanized malleable iron, complete with plated nuts and bolts.

2. Nuts: Tamperproof type.

3. Gaskets: As recommended by the manufacturer.

PART 3 – EXECUTION

3.02 INSTALLATION

B. Pipe laying

8. All temporary water lines shall be ductile iron push on joint pipes with mechanical joint fittings. Thrust restraint at the fittings shall be by concrete thrust blocks and tie rods in conformance with the BW&SC standard details and specifications.

9. All permanent water lines shall be ductile iron restrained joint pipe and fittings. Where indicated on the contract documents, thrust restraint at the fittings shall be by concrete thrust blocks and tie rods in conformance with the BW&SC standard details and specifications.

10. No retainer glands shall be used.

D. Fire hydrants and gate valves shall be installed in accordance with the BW&SC standards, details and specifications. Installation of fire hydrants in locations varying from their locations shown on the Contract Documents shall be subject to approval by the Engineer and the BW&SC.

E. At all times, when pipe laying is not in progress or the trench is unattended, the open ends of pipe shall be closed by a water tight plug or other approved means.

F. Corrosion control measures consisting of electrical bonding of pipe joints, test stations, insulating sleeves and insulating joints shall be installed in accordance with Standard Specifications Sections 05920 and 15050.

G. It shall be the Contractor's responsibility to locate all existing water service connections affected by the new construction. The Contractor shall install new water service connections as indicated on the contract drawings, as directed by the BW&SC and the Engineer, and as stated in these specifications.

3.05 TYPE K COPPER WATER LINE

A. In relaying services, the new copper tubing service pipe shall be the same size as the existing pipe being replaced, except that the minimum size for the new service pipe shall be ¾ inch. 5/8-inch pipe shall be replaced with one-inch pipe. The fittings for a ¾ inch or one-inch water service pipe shall include a corporation stop and a curb stop. The corporation stop tube shall be extended to 18 inches below

finished grade. The curb stop tube shall be extended to finished grade. The fittings for a 1-1/2 inch and 2-inch service pipe shall include a corporation stop with its tube extended to finish grade. Connections to the existing services will be made at the water shut offs with adapter couplings.

B. Joints in the copper service pipe shall be kept to a minimum. Where necessary, joints shall be made with cast brass three part compression couplings or flared tube fittings conforming to ANSI Standard Specification B16.26, latest edition. Bends in copper service pipe shall be made with a bending tool especially designed for the purpose.

C. The depth of the service trench shall be at least 5-1/2 feet below the finished grade and no less than 2-1/2 feet wide. Where copper water lines are installed to a depth of less than 5-1/2 feet below finished grade, the copper water line shall be installed with insulation, vapor barrier and an all purpose jacket.

3.06 CORPORATION STOP

A. Corporation stops shall be provided with a tube section of the type shown on the BW&SC standard details. For ¾ inch and one-inch services, the tube section shall extend to 18 inches below finished grade and capped. For 1-1/2 inch and two inch copper water line services, the tube section shall extend to finished grade and be provided with a BW&SC standard nine-inch square access frame and cover installed flush with finished grade. In all cases, the tube section shall be set on one brick placed on each side of the corporation stop. The base beneath the water line at these locations shall be thoroughly compacted.

B. Corporation stops shall be bronze, made from castings, the materials of which shall conform to ANSI/ASTM Standard Specification B61, latest edition. Corporation stop sizes shall be the same size as the proposed copper water line. Corporation stops shall be as made by the Hayes Manufacturing Co., Mueller Manufacturing Co. or an approved equivalent.

C. Couplings shall be of bronze made from castings. The material of which shall conform to ANSI/ASTM Standard Specifications B61 or B62, latest editions.

D. Each corporation stop shall have a solid plug that operates freely as adjusted for testing. All plugs shall have a full, round, smooth reamed waterway. Each stop shall be individually tested under a hydrostatic head of 250 psi and found to be tight before leaving the factory. A certified statement from the manufacturer to this effect shall be furnished.

E. The inlet end of the corporation stop shall be long enough to pass entirely through the pipe wall and project at least 1/8 inch beyond the inside face of the pipe. Inlet threads shall conform to the AWWA Standard taper thread, latest edition. The outlet threads shall conform to AWWA C800, latest edition. Corporation stops shall open by turning in the direction conforming to the standards of the BW&SC.

F. All corporation stops for copper service water lines shall be of the type adapted for use with a straight service.

G. Corporation stops shall be screwed firmly into the water mains with the key placed upward. Corporation stops shall be left open (turned on) before the trench is backfilled so as to allow examination of connections for leaks.

H. All joints between corporation stops, fittings and service water lines shall be made watertight.

I. Corporation frames and covers, tubes and caps shall be cast iron, thoroughly coated with two coats of asphalt varnish, and shall conform to the requirements of the BW&SC standard details and specifications. Access tubes are to be set plumb.

J. The water main shall be tapped by means of a tapping machine manufactured for the purpose and furnished by the Contractor. The tap and drill of the tapping machine must be kept sharp. The taps shall be so located that the corporation stops, when inserted in a tap, will be at or above the horizontal diameter of the pipe and the service water line must have a cover of at least 5-1/2 feet at all points.

3.07 CURB STOP

A. Curb stops shall be bronze made from castings, the materials of which shall conform to the ANSI/ASTM Standard Specification B61, latest edition. Sizes shall be the same as the proposed copper water service line. Curb stops shall have a coupling adapter, if required, to connect to new or existing copper water services.

B. Couplings shall be of bronze made from castings, the materials of which shall conform to ANSI/ASTM Standard Specification B61 or B62, latest editions. The coupling of the open end of a curb stop shall be provided with a copper washer to keep out the dirt and other foreign matter until the new service is connected to the existing service.

C. Each curb stop shall have a solid plug that operates freely as adjusted for testing. All plugs shall have a full, round, smooth reamed waterway. Curb stops shall have plugs hand ground into the body of the fittings. Each curb stop shall be individually tested under a hydrostatic head of 250 psi and found to be tight before departing the factory. A certified statement of the manufacturer to this effect shall be furnished to the Engineer prior to installation. Curb stops shall be tee head and shall have male threaded ends, including copper service pipe couplings. All threaded parts of fittings shall have American Standard Iron Pipe Threads, or otherwise approved by the Engineer. Curb stops shall be opened by turning in the direction conforming to the standards of the BW&SC. Curb stops shall be as made by the Hayes Manufacturing Company, Mueller Manufacturing Company or an approved equivalent.

D. Each curb stop shall be provided with a new extension service box of the sliding type. The service box shall be heavy weight, light gray, cast iron, true to pattern and free from flaws. The cover shall be lettered conforming to the requirements of the BW&SC and shall have a threaded plug which can be removed for operation of the stop. Boxes and covers shall be thoroughly coated with two coats of asphalt varnish.

E. Curb stops shall be set in a bed of clean gravel or material of equal draining quantity.

F. All joints between stops, fittings and service pipe shall be made watertight.

3.08 VALVES

A. All abandoned butterfly and/or gate valves and boxes removed during construction shall be stacked in an area designated by the Engineer for pick up by the BW&SC.

3.09 WATER SERVICE

A. It shall be the Contractor's responsibility to supply adequate water at all times to the premises of any water customer and to furnish all labor material and equipment to make the necessary connections to supply water to said premises at all times. The method, manner of doing work, materials and devices

used in supplying temporary water service shall be subject to the approval of the Engineer and the BW&SC.

B. The Contractor shall be responsible for notifying the water customers 48 hours beforehand of the shutting off of water service and for undertaking the work in sections, as necessary, to allow completion of the work and restoration of water service to the customers premises within the times specified by the BW&SC and the Engineer.

C. No water main supplying water for fire protection services shall be shut down without prior approval of the Engineer, BW&SC and the Boston Fire Department. The Contractor shall provide a written 48-hour notice to the affected water users with a copy to the Engineer.

3.10 INSULATION

A. MHD Standard Specification Section 300.

3.11 TEMPORARY BY-PASS SYSTEM

A. The temporary by-pass piping system shall be installed on existing grade from an existing fire hydrant located at STA 31+85 right to an existing fire hydrant located at STA 34+45 right. Installation of the temporary by-pass piping system shall be in accordance with Section C8 of the BW&SC standard specifications.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Pipe shall be measured by the lineal foot, complete in place, for each type, size and class along the axis of the pipe. No deduction for the space occupied by valves and standard fittings shall be made. Where two pipes join, measurement shall be made to the intersection of the axis.

B. Gate valves and boxes, butterfly valves and boxes, and hydrants will be measured per each for each type and size.

C. Testing; disinfection; corrosion control; coating; insulation; bedding material; excavation, backfilling, compaction and disposal of excess excavated materials; porous fill; thrust blocks; concrete and reinforcement; plugs; permanent or temporary structural support; permanent or temporary patch; and stacking of abandoned valves and boxes will not be separately measured for payment but the cost in connection therewith shall be included in the Contract unit prices for pipes to which they pertain.

D. Fittings, including but not necessarily limited to bends, tees, caps, wyes, couplings, tie rods, sleeves, reducers, increasers, blow off fittings and other specials, will be measured by the pound, complete in place. The weight shall be as stated on the supplier's invoice or the manufacturer's rated weight as listed in the catalog, whichever is less. For new special fittings, not listed in the catalog, the weight will be the invoice weight.

E. Copper service pipe will be measured by the linear foot, complete in place. Measurement will start from the center of the corporation stop key. No deductions in length will be made for curb stops or couplings.

F. Corporation stops and boxes will be measured by the number of units of each size actually installed, complete in place.

G. Curb stops and boxes will be measured by the number of units of each size actually installed, complete in place.

H. Concrete collars required for gate, valve and service boxes will not be separately measured, but all costs in connection therewith shall be included as part of the Contract unit prices for the relevant gate, valve and service box items.

I. Gate and/or valve boxes requiring adjustment will be measured by count actually adjusted, complete in place, as specified in Standard Specification Section 02650.

J. Temporary customer water service will not be measured separately but the costs in connection therewith shall be included as part of the Contract unit prices for the various pay items under this Section.

K. The temporary by-pass piping system will be measured as a unit complete in place.

4.02 PAYMENT

A. Pipe will be paid for at the Contract unit price per linear foot for each type, size and class for the quantities determined as specified herein.

B. Gate valves and boxes, butterfly valves and boxes and hydrants will be paid for at the Contract unit price per each for each type and size for the quantities determined as specified herein.

C. Fittings will be paid for at the Contract unit price per pound for the quantities determined as specified herein.

D. Copper service pipe will be paid for at the Contract unit price per linear foot for each type and size for the quantities determined as specified herein.

E. Corporation stops and boxes will be paid for at the Contract unit price per each for each type and size for the quantities determined as specified herein.

F. Curb stops and boxes will be paid for at the Contract unit price per each for each type and size for the quantities determined as specified herein.

G. Gate and/or valve boxes requiring adjustment will be paid for at the Contract unit price per each for the quantities determined as specified herein as specified in Specification Section 02650.

H. The temporary by-pass piping system will be paid for under Item 0255.005, Temporary Water Service.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
0255.005	TEMPORARY WATER SERVICE	LS
0211.463	BOSTON WATER AND SEWER COMMISSION UTILITIES	AL
1519.320	¾" CURB STOP, BOX AND COVER	EA
1519.325	1" CURB STOP, BOX AND COVER	EA

1519.592	1-1/2" CORPORATION COCK, BOX AND COVER	EA
1519.594	3/4" CORPORATION COCK, BOX AND COVER	EA
1519.596	2" CORPORATION COCK, BOX AND COVER	EA
1519.612	1" CORPORATION COCK, BOX AND COVER	EA
1520.106	6" GATE AND GATE BOX	EA
1520.412	12" X 12" TAPPING SLEEVE VALVE AND BOX	EA
1520.454	12" INSERTION VALVE AND BOX	EA
1521.050	6" DUCTILE IRON WATER MAIN CEMENT LINED	LF
1521.062	12" DUCTILE IRON WATER MAIN CEMENT LINED	LF
1521.098	DUCTILE IRON FITTINGS FOR WATER MAIN	LB
1521.605	3/4" TYPE K COPPER WATER LINE	LF
1521.610	1" TYPE K COPPER WATER LINE	LF
1521.614	1-1/2" TYPE K COPPER WATER LINE	LF
1521.617	2" TYPE K COPPER WATER LINE	LF

- END OF SECTION -

SECTION 02800

EXTERIOR CONDUIT SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies exterior electrical distribution and communication facilities including concrete encased underground duct banks, conduits, and associated manholes, handboxes, handholes, vaults, covers, and appurtenances in accordance with Standard Specification Section 02800, except as modified herein.

B. Exterior conduits and duct banks include, but not necessarily limited to, telephone, electric, fire alarm, police signal, traffic signal, cable TV, communications and lighting.

1.02 SUBMITTALS

A. Submit for approval to the Engineer and affected utility company a detailed plan and schedule for proceeding with the work. Submit to the Engineer written evidence of utility company's approval of proposed procedure, schedules and materials.

B. Certificates of compliance for conduits and appurtenances

C. Brochures and catalog cuts

D. Conduit location working drawings

E. Samples of all units along with certified engineering data. Upon approval of the samples and test data, delivery of the units shall be made. No changes or modifications, with the exception of minor changes not affecting operation or appearance, will be allowed.

1.03 JOB CONDITIONS

A. Through the Engineer, establish direct and continuous liaison with utility companies who are involved in the indicated work. Verify or determine interface with the utility company, and work to be performed, and materials to be furnished by the utility company.

B. The Contractor shall be responsible for necessary coordination and project engineering with the private utility companies and public agencies.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01020 Allowances

B. Section 02200 Earthwork

C. Section 02290 Dewatering

D. Section 02295 Support of Excavation

E. Section 02400 Drainage and Sewer Systems

F. Section 02453 Traffic Signal

G. Section 02650 Existing Site Utilities

H. Section 02651 Electric Facilities Relocation

I. Section 02652 Gas Facilities Relocation

J. Section 02653 Telephone Facilities Relocation

K. Section 02654 Fire Alarm Facilities Relocation

L. Section 02713 Exterior Water Distribution Systems

M. Section 03100 Concrete Formwork

N. Section 03200 Concrete Reinforcement

O. Section 03310 Portland Cement Concrete

P. Section 03400 Precast Concrete

Q. Section 04200 Unit masonry

R. Section 05500 Miscellaneous Metal

S. Section 05920 Corrosion Control

T. Section 16050 Basic Materials and Methods for Electrical Work

U. Section 16550 Highway and Roadway Lighting

1.05 INSPECTION

A. Work inspection specified in this Section will be made by the respective utility company involved and by the Authority.

1.06 MODIFICATIONS

A. In the event that the supplier makes a modification or change to the specified unit, or development of a new unit to replace the specified unit, written notification shall be provided to the Engineer. It shall be the Engineers' option to accept delivery of the modified or new unit, or to request the specified unit. In no case shall the delivery of any new or modified unit result in any additional increase in cost to the Authority.

1.07 GUARANTEES/WARRANTIES

A. All manufacturers' guarantees against defects in materials and workmanship shall be transferable to any authorized agency of the City of Boston or private utility company who shall be responsible for maintenance. Structural defects in the unit shall be cause for complete replacement of the unit. Defects in any component part of the unit, which is covered by the guarantee, may be replaced on an individual

basis at the discretion of the Engineer. The cost of such replacement shall be borne by the Contractor. Any defective unit or component thereof, returned within the guarantee period, shall be replaced by the Contractor who shall make arrangements to return any unit or components thereof, to the manufacturer at the Contractor's expense.

B. The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of each unit included in this Section shall be turned over to the Authority at the time of acceptance of the project, at no cost to the Authority. Each warranty so furnished shall indicate its expiration date and be in effect for a minimum period of one (1) year from the date the units were placed in continuous operation. Warranties shall be transferable to any agency designated by the Authority.

C. If, within one (1) year from the date the units are placed in continuous operation, the equipment and materials do not meet the warrants specified above and the Engineer notifies the Contractor or his authorized representative promptly, the Contractor or his authorized representative thereupon, shall correct any defects either by repairing or replacing any defective part or parts, at no cost to the Authority.

PART 2 – PRODUCTS

2.02 PRECAST MANHOLE SECTIONS

A. AASHTO M199, latest edition.

B. NStar Electric manholes: Section 02651

C. Verizon manholes: Section 02653

2.03 CONDUIT AND FITTINGS

D. PVC conduit: Section 16050

1. Electric conduits and duct banks shall be PVC Type EB conforming to NEMA TC-6 and ASTM F512, latest editions.

2. Telephone conduits and duct banks shall be PVC Type B conforming to the applicable standards of AT-8546, GT 8343 and NEMA TC-10, latest editions.

2.04 CONCRETE ENCASEMENT

A. 4000 psi, ¾ inch aggregate concrete, Standard Specification Section 03310.

PART 3 – EXECUTION

3.01 EXCAVATING AND BACKFILLING

A. Standard Specification Section 02200.

3.02 PLACING DUCTS

E. Minimum cover for electric, telephone and communication conduits and duct banks shall be four feet under the streets and roadways and 4.5 feet under the sidewalks.

F. Install NStar Electric and Verizon conduits and duct banks in reinforced concrete encasement in accordance with the respective utility company's details and as indicated on the contract documents.

3.05 ENTERING NSTAR ELECTRIC MANHOLES

A. The Contractor shall not enter any existing NStar Electric manholes. The installation of conduit into existing NStar Electric manholes shall be done by an NStar Electric authorized Contractor under NStar Electric's supervision. Conduit running to the existing NStar Electric manholes will be terminated by the Contractor outside the manhole walls at a distance and location acceptable to NStar Electric. Breaking the manhole walls, attaching a sleeve to the conduit and forming a bell mouth in the manhole, and installing the cable from the existing manhole will be accomplished by an NStar Electric authorized Contractor.

B. The Contractor shall be responsible for payment of any charges made by NStar Electric for which no direct compensation will be made to the Contractor; it being agreed and understood that full compensation for these charges will be included in the allowance for NStar Electric. Contractor service connection charges are not part of the allowance and will be paid for by the Contractor.

3.06 ENTERING VERIZON MANHOLES

A. The Contractor shall secure the necessary permission from Verizon to break into their existing manholes and shall give the necessary notification to Verizon in order that an inspector will be present at the time of the work. The installation of conduit into Verizon manholes shall be in strict accordance with the requirements and procedures of Verizon.

B. The Contractor shall be responsible for payment of any charges made by Verizon for which no direct compensation will be made to the Contractor; it being agreed and understood that full compensation for these charges will be included in the allowance for Verizon. Contractor service connection charges are not part of the allowance and will be paid for by the Contractor.

3.07 PULL WIRE

A. All conduits and duct banks shall have installed a monofilament polypropylene pull wire with a tensile stress of 240 pounds.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

E. Conduits and duct banks shall be measured by the linear foot, along the center line, for each type and size with deductions for manholes or other structures from the inside faces of each structure. When conduits and duct banks terminate in pull boxes and/or junction boxes, measurement shall be to the centerline of the pull box and/or junction box. Pull wire, fittings, joints, coatings, excavation, backfilling, compaction, bedding, disposal of excess excavated materials, permanent or temporary patch, concrete, concrete reinforcement, permanent or temporary structural support and other necessary work in connection therewith, shall not be separately measured for payment, but all costs thereof shall be included as part of the Contract unit price for the conduits and/or duct banks to which they pertain.

F. Rock excavation, encountered during performance of the work specified in this Section, shall be separately measured and paid for as specified in Standard Specification Section 02200.

G. Excavation, backfill, compaction, and disposal of excess excavated material shall be measured and paid as specified in Standard Section 02200.

4.02 PAYMENT

A. Payment for the work specified in this Section shall be made at the Contract unit price for the quantities determined as specified above.

4.03 PAYMENT ITEMS

Item No.	Description	Unit
1615.280	2 - 4" DUCT TELEPHONE CONDUIT CONCRETE ENCASED	LF
1615.282	4 - 4" DUCT TELEPHONE CONDUIT CONCRETE ENCASED	LF
1617.600	6 – 5" PVC CONDUIT CONCRETE ENCASED	LF

- END OF SECTION -

SECTION 02820

FOUNTAIN SCULPTURE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies all work required to remove, store, protect and reinstall the existing fountain sculpture and related items required to complete the work as indicated on the Drawings, as specified herein, and as directed by the original artist in the field.

B. The term "Fountain Sculpture" includes the central sculpture in Lewis Mall and all rocks and boulders in the area associated with the sculpture and all utilities connections associated with the sculpture.

C. The term "Artist" as referred to in this Section, shall refer to:

Mr. Edward Monti
285 Franklin Street
Quincy, MA 02169
tel 617-479-6819
fax 617-479-0757

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements, which affect the work of this Section.

B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02200 – Earthwork.
2. Section 02516 – Concrete Pavers.
3. Section 03300 – Cast-in-Place Concrete.
4. Section 16050 – Basic Materials and Methods for Electrical Work

1.03 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein. References and standards shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. Standard Specification: Massachusetts Bay Transportation Authority (MBTA), Standard Specifications for Construction, latest edition.
2. ASTM: American Society for Testing and Materials, latest edition.
3. OSHA: Occupational Safety Hazard Administration, latest requirements.

1.04 SUBMITTALS

A. Request for deviations from Specifications: If any deviations from specifications are proposed, include written description and reasons for proposed deviations. Do not proceed until written approval by the Engineer of any deviations.

B. Shop Drawings/Product Literature: Contractor shall submit product literature and coordinated Shop Drawings, which shall show required sizes, dimensions, sections, profiles of units, the arrangement and provision for jointing, anchoring, fastening and supports and other necessary details for delivery and lifting devices and reception or installation of other work. Show in large-scale details any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Engineer. Schedule Shop Drawings and submittal of product literature so that they can be accepted a minimum of 30 days prior to installation represented by the Shop Drawings and product literature.

C. Shop drawings depicting the proposed methods and sequencing of the dismantling of the Fountain Sculpture

1.05 EXAMINATION OF CONDITIONS AND DOCUMENTS

A. All areas shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including but not limited to the potential need for storing materials prior to final installation.

1.06 QUALITY ASSURANCE AND PRODUCT HANDLING

A. Storage and Handling: Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury and theft.

1.07 SAFETY

A. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.

B. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the worksite and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall post work areas, provide police details and/or erect and maintain protective devices as necessary to the Owner's satisfaction, including but not limited to barricades, lights and warning signs.

SECTION 14240

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the furnishing of all labor, materials, and equipment with experienced supervision for the delivery, assembly of elevator EV-1 and (EV-2 as an Add-Alternate as explained below) with all systems and all incidentals, installation, system operation, testing and ready for use elevators as specified herein and in accordance with the Contract Documents.

B. Add-Alternate No. 3: The base bid includes the construction of the elevator pit, pit drainage , CMU reinforced shaft walls, temporary lower level door screen, concrete, concrete grade slab to cap the top of the elevators shaft below grade. This Add-Alternate includes all costs for the furnishing of all labor, materials, and equipment with experienced supervision for the delivery and assembly of one elevator (EV-2) with all systems connected for operation as described in this Section. In summary, the alternate includes elevators equipment, doors, pit ladder, mechanical support, and elevators Headhouse.

C. During this Project modification to the Maverick Station, the Station will remain open during construction. The relationship of each Phase of construction phasing to its predecessor and successor stages is critical to maintain Station egress. Since the installation of each elevator in its scheduled Phase is critical to the construction schedule for physically challenged pedestrians, the elevator(s) must be fabricated, installed, obtain an operation certificate from DPS/EID and open to the public in accordance with the Phase of construction as shown in the Contract Documents. The elevator Manufacturer/Installer is required to coordinate with the Contractor and complete the elevator(s) within the Contractors scheduled time frame.

D. The work covered in this Section shall be coordinated and complimentary performed with the work of other trades included, but not limited to Article 1.03, Related Work Specified Elsewhere.

1.02 TEMPORARY AND PERMANENT ELECTRICAL POWER SERVICES

A. Electric service for the elevator system shall be 480 volts, AC, 3 phase, 4 wire, 60 hertz terminating in a disconnect switch in the elevator machine room. Provide the Power Supply Confirmation Data Form listed as Attachment "A" according to Article 1.09 Submittals.

B. Electric service for lighting and 20 ampere duplex receptacles shall be 120 volts, AC, single phase, 3 wire, 60 hertz terminating in the elevator pits and remote machine rooms at a junction box located so that the light switches and receptacles can be used without passing over any part of the machinery.

1. All electrical wiring for power and elevator operation conduits systems for EV-1 and EV-2 from its adjacent machine room to the Inbound Platform and to and within the hoistway shall be weatherproof.

C. Any practice employed by the Contractor, which is obviously hazardous as determined by the Engineer, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Engineer to discontinue such practice.

1.08 RECORD DRAWINGS

A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all his work, including thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.

B. Prior to final acceptance of the work, all "as-built" data shall be transferred by the Contractor to a complete set of reproducible record drawings in ink or photolitho reproductions on mylar (4 mm), furnished by the Engineer. The Contractor's Registered Land Surveyor shall perform this work with the cooperation on the Contractor as required. After review and approval by the Engineer, the "Record As-built Drawings" will be completed and delivered to the Engineer.

1.09 QUALIFICATIONS

A. Contractor Qualifications: All work of removing, stockpiling, protecting and installing the existing fountain sculpture shall be assigned to an experienced and qualified Contractor with a minimum of five (5) years of experience on projects of a similar size and complexity and who employs experienced workmen who work under the full time supervision of a qualified foreman.

1.10 MANNER OF CONDUCTING THE WORK

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with Americans with Disabilities Act requirements.
2. Compliance with governing laws and building codes.
3. Safety, protection, and convenience of the public and workmen.
4. Protection of the existing building structure, materials and finishes to remain from damage.
5. Minimization of dirt and dust proliferation.
6. Avoidance of any damage to existing vegetation to remain.
7. Maintenance of existing site drainage and drainage structures and protection of constructions from siltation during construction.
8. Provide unobstructed legal exits and entrances at all times.

B. All work shall be done in accordance with the governing laws and building codes and the Contractor shall procure all necessary permits required.

PART 2 - PRODUCTS

2.01 FOUNTAIN SCULPTURE

A. Fountain Sculpture shall be the existing fountain sculpture complete with concrete pool, plumbing and electrical work existing on the site and as additional provided for on the Contract Drawings.

B. Concrete for footings and concrete pool, including concrete reinforcing and formwork, shall be in accordance with Section 03300 – Cast-in-Place Concrete.

PART 3 - EXECUTION

3.01 FOUNTAIN SCULPTURE

A. The Contractor shall remove, store and reinstall the fountain sculpture complete with concrete basin as in conformance with approved Shop Drawings and as directed by the Artist.

B. The Contractor shall be responsible for the timing delivery of all materials required to complete the removal, storage, and reinstallation of the fountain so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling or vandalism.

C. Pre-Removal: The following process shall be followed:

1. A walk-through of site shall be conducted by the Contractor, the Artist and the Engineer. The Contractor shall employ a Licensed Electrician and Plumber, who shall also be in attendance at the walk through to assess electrical and plumbing disconnections and re-connections.
2. Drawings to catalog above-grade location of sculpture, sculpture materials and location, and surrounding materials, shall be prepared by the Contractor and the Artist.
3. Drawings showing the existing electrical and plumbing systems shall be prepared by the Contractor.
4. Marking and documenting of individual pieces of Fountain Sculpture shall be performed by or supervised by the Artist.
5. Hoisting materials, including strapping, chains, and ropes necessary for removal of the Fountain Sculpture, shall be identified and procured by the Contractor, as directed and coordinated with the Artist.
6. The Contractor shall provide any heavy equipment and labor to remove and transport sculpture to the storage facility.

D. Removal and Storage: Removal and storage shall be supervised by the Artist who will supervise all steps of removal and placement into storage. The following process shall be followed:

1. The Fountain Sculpture shall be carefully dismantled.
2. Further marking and documenting of sculpture shall be performed, if necessary.
3. The fountain Sculpture pieces shall be packaged, protected, and loaded onto appropriate transport vehicle.
4. Preparation of storage facility, which shall be located outside of project limit of work, shall be performed.
5. The transport pieces of the Fountain Sculpture shall be off-loading at the approved storage facility.

E. Re-Installation: The Artist will supervise all steps of site preparation and re-installation as follows:

1. The Contractor shall do a walk-through of site with the Artist upon completion of area construction.
2. The Contractor shall transport the Fountain Sculpture piece back to the site.
3. The Contractor shall provide heavy equipment, burning tools, or other equipment as required by the Artist and labor to fully re-install sculpture.
4. Reconstruction of the Fountain Sculpture shall take place as directed by the Artist.
5. Final electrical and plumbing connections shall be made.
6. The Contractor shall be responsible for clean up of site.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment of the allowance Item 0400.100, Sculpture Allowance, will be made to reimburse the Contractor for work and materials performed and supplied by the Contractor and others as specified herein. For construction activities, the Contractor shall coordinate with the Authority Inspector at the end of every day work. A list of all activities will be prepared. A complete record of all costs, labor, equipment, and materials used each day in performing this work will be created, and will be signed by both the Contractor and the Authority Inspector.

PAYMENT

A. For the Allowance Item 0400.100, Sculpture Allowances, prior to beginning any work, the Contractor shall request an itemized written estimate of costs from all subconsultants and design firms, the Artist, utilities companies, and City and State agencies for the work to be performed. The Contractor shall submit these written estimates to the Engineer for review and approval. For work performed by the Contractor, he shall be reimbursed in accordance with MBTA Standard Specifications, Division 1 – General Requirements, Section 01150, Article 1.05, paragraph B.2. The Authority will make no payments exceeding these amounts.

B. Payment for the allowance Item 0400.100, Sculpture Allowances will be based upon receipted invoices and signed receipts, without charges for Contractor overhead and profit, except when the Contractor performs the work, submitted for the actual work performed.

C. The Contractor shall submit receipted copies of itemized invoices for such work to the Authority for partial payments. Payment will be based upon receipted invoices and signed receipts from the utility companies, private firms, subcontractors, or the City and/or State agencies to the Contractor, four (4) copies of which shall be submitted to the Authority.

4.03 PAYMENT ITEMS

ITEM NUMBER	PAYMENT ITEM	UNIT
0400.100	SCULPTURE ALLOWANCE	AL

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies designing, furnishing, constructing, and removing formwork, including falsework and centering, for cast-in-place concrete structures and members in accordance with Standard Specification Construction Section 03100, except as modified herein.

1.02 QUALITY CONTROL

A. Design Criteria

1. Design and construct formwork in accordance with ACI 301 and ACI 347, except as modified herein.

2. Formwork

b. Design forms to have sufficient strength to carry the dead weight of the concrete as a liquid plus a 50 psf construction live load and to produce concrete meeting the specified tolerances. Maximum deflection of form facing materials reflected in concrete surfaces exposed to view: 1/240 of the span between structural members.

c. The formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the wet concrete, support settlement/displacement, and due to all other applicable construction loads.

d. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placement operations, using wedges or jacks or a combobation thereof.

3. Falsework

c. Design forms and false work to include assumed values of live loads, dead loads weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, lateral stability, and other factors pertinent to safety of the structure during construction.

B. The design and engineering of the formwork system as well as its construction, shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

Delete Subsection 2.01.A in its entirety and replace with the following:

A. Formwork

1. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown.

   a. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.

   b. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

2. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

3. Forms for Cylindrical Columns and Supports: Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

4. Pan-Type Forms: Glass -fiber-reinforced plastic or formed steel, stiffened to support weight of placed concrete without deformation.

5. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

6. Form Ties: Factory-fabricated, adjustable-length, removable or snap off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

   a. Form ties and spreaders for walls in areas exposed to view shall be type SPC Stainless Steel "Snap-Ties", by Richmond Screw Anchor Co.; Dayton Sure-Grip and Shore Co., The Burke Company or an approved substitute by the Engineer. Wire ties shall not be used. Where concrete is left to be exposed, ties shall have removable tapered, plastic cones with 1 inch outside diameter.

   b. In lieu of form ties specified above, fiberglass form ties as manufactured by RJD Industries or Architect approved substitute shall be used to provide wall surfaces with no ties holes and no metal exposed at wall surface. Fiberglass form ties shall be standard grey color. The concrete structure shall be finished by grinding the fiberglass form tie flush with the finish surface of the concrete structure. If tapered architectural holes are required, dummy tapered cones having a 1" setback and a taper from 1" to 1-1/4 shall be fastened to the interior of the formwork to acheive the specified pattern on the finish structure.

   c. Architectural concrete form ties shall be stainless steel and shall be placed in non-tunnel reveals, spaced evenly.

7. Chamfer and Reveal Strips: Extruded vinyl type.

8. Moisture Retarder: polyethylene or waterproof paper or waterproof board to keep moisture within formed area during pouring and curing of concrete.

a. Waterproof paper: ASTM C171.

b. Polyethylene film: ASTM C171.

c. Polyethylene-coated burlap: ASTM C171.

d. Liquid membrane: ASTM C156.

9. Form Liners: As specified in Specification Section 03350, Architectural Concrete.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. General

7. For concrete exposed to view in public areas, the forms shall utilize the largest practical sizes of panels arranged so that joints between panels and form tie arrangement occurs in a regular and orderly manner approved by the Engineer.

8. Set and build into the formwork anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.

F. Workmanship

1. Forms shall be made and erected to conform to shapes, lines, grades, and dimensions of concrete called for on the Contract Drawings, and shall remain in correct position during and after deposition of concrete.

2. Plywood shall be placed with the grain of the outer plies in the direction of the span. All form panels shall be in a neat, symmetrical pattern with the horizontal joints level and continuous, to produce form marks which conform to the general lines of the structure.

3. All forms joints shall be filled with an approved quick-setting compound and finished flush with the interior of the form.

4. Forms shall be securely braced against lateral deflections and so anchored to shores or other supporting surfaces that upward or lateral movement during placement will be prevented. Final position of forms after filling with concrete shall conform to the concrete tolerances specified herein.

5. Wedges used for final adjustment of the forms prior to concrete placement shall be fastened in position after the final check.

6. Cleaning and tightening: Thoroughly clean form and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and other debris just before concrete is placed. Retighten forms and bracing after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

7. Mill scale and other ferrous deposits on the steel forms shall be removed by sandblasting or otherwise removed from the contact surface for all forms prior to use. All forms shall have a bond breaker coating. Protect existing structure during removal process.

G. Embedded Items

1. Clean the embedded items.

H. Joints: Provide construction joints as shown on the Contract Drawings. Provide expansion joist only where shown and in accordance with Section 03300.

I. Preparation of Form Surfaces:

1. Coat surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound, where required or allowed, before reinforcement is placed.

2. Surfaces of forms and embedded materials shall be cleaned of any accumulated mortar or grout from previous concreting operations.

3. Before forms are re-used, the surfaces that will be in contact with new concrete shall be thoroughly cleaned, damaged areas repaired and unwanted projections and nails removed, to the satisfaction of the Engineer.

4. Coat forms with bond breaker prior to placement of reinforcing steel.

5. Coat bolts and rods that are to be removed with bond breaker.

6. Thin form-coating compounds only with thinning agent of type and in amount, and under conditions of form-coating, compound manufacturer's directions.

7. Do not allow excess form-coating material to accumulate in forms or to come in contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

8. Coat steel forms with a nonstaining, rust preventative material. Rust-stained formwork is not acceptable.

J. Forms for concrete exposed to view

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter wood forms by driving ties through improperly prepared holes.

2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.

3. Use extra studs, walers, and bracing to prevent objectionable bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

K. Form Release Agent

1. Coat form contact surface with form release agents before reinforcement is placed. Do not allow excess form release agent to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete apply in compliance with manufacturer's instructions.

3.02 REMOVAL

Delete Subsection 3.02 in its entirety and add the following:

A. The removal of formwork or shoring shall be based on concrete strength and the following conditions shall apply:

1. The structure shall have been cured and protected in accordance with Industry Standards.

2. Remove forms only after concrete has attained the design strength as shown below to carry dead weight and other loads, which they may be further subjected. Field cured cylinders shall have attained the specified strengths designated in the following table at the anticipated time of form removal.

Member	Minimum Strength
Nonbearing walls, mass foundations, sides of beams	2,000 psi
Retaining walls, load bearing walls and piers	2,800 psi,
Slabs, beam soffits, platform soffits, other structural elements	2,500 psi

B. Top forms on sloping surfaces of concrete shall be removed as soon as concrete has attained sufficient stiffness to prevent sagging. Repairs or treatment required shall be preformed at once and be followed by the specified curing.

C. Formwork not supporting weight of concrete, such as sides of footings, may be removed after cumulatively curing at not less than 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

D. Forms and shoring shall be removed in such a manner as permit the concrete to uniformly and gradually take the stresses due to its own weight.

3.03 REUSING FORMS

Add Subsection 3.03 as follows:

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Authority.

PART 4 – MEASUREMENT AND PAYMENT

4.01 GENERAL. No separate measurement or payment will be made for work required under this Section. All

costs in connection therewith shall be incidental to the item of work to which they pertain.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

Under Subsection 1.01; modify Paragraph "A" as follows:

A. This Section specifies furnishing and placing reinforcement for concrete structures in accordance with Standard Specifications Construction Section 03200, except as modified herein.

D. The work of this Section shall conform to the Concrete Reinforcing Steel Institute's "Recommended Practice for Placing Reinforcing Bars" and "Recommended Practice for Placing Bar Supports, Specifications and Nomenclature," copies of which shall be provided by the Contractor and kept in the Project Field Office at all times.

1.03 SUBMITTALS

Under Subsection 1.03A, add sub-paragraph 3 as follows:

A. Shop Drawings and Data

3. The Contractor shall submit to the Engineer for review and approval shop drawings and working drawings of concrete reinforcements for all reinforced concrete structures after the concrete pouring sequences, construction joint locations and placement schedules have been approved by the Engineer.

C. Samples

1. Provide one sample of each type of mechanical splicing device.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Steel Bars: Deformed type conforming to ASTM A615, Grade 60 unless otherwise indicated. Provide epoxy coated reinforcement as indicated on drawings.

C. Welded Steel Wire Fabric:

4. Welded wire fabric shall be supplied in flat sheets only.

F. Splice Devices

1. Sleeve or coupler type, sized to develop minimum 125 percent of bar yield strength.

2. Subject to compliance with requirements above, provide one of the following:

Dowel Bar Splicers - Richmond Screw Anchor Company
Lenton Form Saver - Erico Products, Inc.
Bar Splicers - Bar Splice Products, Inc.

H. Drill and grouted rebar anchorage shall have sufficient embedment to develop the ultimate strength of the rebar.

PART 3 - EXECUTION

Under Subsection 3.01; revise Paragraph "A" to read as follows:

3.01 WELDING OF REINFORCEMENT

A. No welding of reinforcement for splicing shall be permitted except as shown on the Contract Drawings. Welding shall be done in strict accordance with AWS D1.4 Structural Welding Code for Reinforcing Steel, American Welding Society, using preheat and quality requirements applicable to permanent structural welds.

Under Subsection 3.02; revise Paragraph "A" to read as follows:
A. Reinforcing steel shall be clean and free of dirt, scale, paint, oil, grease, and other foreign matter where placed in the work.

Under Subsection 3.04; Replace to read as follows:
3.04 SPLICING AND LAPPING

A. Furnish reinforcing bars in full length to the extent of maximum shipping length if required and as shown on the Contract Drawings. Furnish splices and laps as shown on the Contract Drawings. Splices and laps not indicated or dimensioned shall be in accordance with ACI 318 and ACI 315, and will be permitted only where shown on the approved shop drawings. The number of such splices or laps shall be limited to one per bar or an absolute minimum.

B. All splicing devices shall be installed in accordance with manufacturer instructions and as shown on the Contract Drawings.

C. Mechanical splice devices may be substituted for lap spliced with the approval of the Design Engineer.

PART 4 - MEASUREMENT AND PAYMENT

Under Part 4, delete Subsection 4.01 and 4.02 and replace with subsection 4.01 through 4.03 as follows:

4.01 MEASUREMENT

A. Plain and epoxy coated reinforcing steel bars and wire reinforcement will each be measured by the pound, complete in place.

1. Weights will be determined from computations based on the calculated weights as listed in ASTM A615. For epoxy coated reinforcement, the weight of the epoxy coating will not be included.

2. The laps of bars for splices necessary to conform to accepted shop drawings and for indicated splices will be measured for payment. When bars are spliced by welding, the weight for welding will be computed for lapped splices.

B. Plain and epoxy coated welded wire fabric will each be measured by the square yard of each configuration placed. Quantities will be the actual number of square yards measured complete in place with no allowance for overlap.

C. Reinforcement and Accessories Not Measured

1. The following reinforcement and accessory items will not be measured for payment:

a. Clips, ties, bar supports, spacers, chairs, or other devices for holding reinforcing steel in place, includingepoxy coating.

b. Additional reinforcing steel for splices permitted by the Authority for Contractor's convenience.

c. Overrun of scale weights of reinforcing steel including epoxy coating.

d. Reinforcing steel and accessories, including epoxy coating, required for lump sum items.

e. Dowel bar splicer, reinforcing bar splicers, including epoxy coating.

D. Drilling and grouting for dowels into existing concrete will be measured per linear foot of hole depth drilled at location shown on the plans and in accordance with the minimum depth of embedment requirements shown in the plan general notes, complete in place, and approved by the Engineer.

4.02 PAYMENT

A. Plain and epoxy coated reinforcing steel bars, wire reinforcement, welded wire fabric, and drilling and grouting will be paid for at the Contract unit prices for the quantities determined as specified above. All costs for epoxy coatings, as required by the contract drawings, will be considered incidental to the item Reinforcing Steel.

B. Payment for Drill and Grouting dowels will be paid for at the Contract unit price for the quantities as specified above and shall include all costs for labor, equipment and materials, including grout. Payment for dowels and reinforcement to be grouted will be measured separately for payment as Reinforcing Steel.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0321.100	REINFORCING STEEL	LB
0321.210	DRILL AND GROUT	LF
0321.305	WIRE MESH REINFORCEMENT	SY

END OF SECTION

SECTION 03253

WATERSTOPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing extruded polyvinyl chloride (PVC) waterstops in accordance with Standard Specification 03253, except as modified herein.

PART 3 - EXECUTION

3.02 INSTALLATION

Under Subsection 3.02 revise Paragraph "E" as follows:

E. When installed in an expansion joint, exercise care in pouring so that the closed hollow center-bulb or the tear-web remains in the gap between the first and second pour, to allow for maximum elongation with minimum stress on the portion of the waterstop embedded in the concrete. Install expansion joint material and a sealant in the joint, as indicated, to prevent foreign matter from accumulating in the joint area. When a sealant is used, place a separator between the sealant and the waterstop to ensure that both the waterstop and sealant best perform their respective functions.

3.03 SPLICING

Under Subsection 3.03; add new Paragraph "B" as follows:

B. Splice PVC waterstops as required to provide continuous waterstops.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement nor payment will be made for waterstops; all costs in connection therewith shall be included in the prices paid for the cast-in-place concrete to which the waterstop pertains.

END OF SECTION

SECTION 03255

RE-INJECTABLE GROUT TUBES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies furnishing and installing re-injectable tubes and remedial grout at interface joints between existing concrete and proposed concrete.

1.02 SUBMITTALS

A. Submit manufacturer's literature for products provided under this section.

B. A key plan indicating the route for each tube and the location of the associated junction box shall be submitted with route numbers and boxes labeled as part of the concrete shop drawing submittal.

C. After the submittal has been approved and the re-injectable grout tube system installed, the contractor shall submit an As-built mylar, of the approved as-built system layout routes, injection boxes, etc., conforming to the MBTA standards, stamped and signed by a Massachusetts registered surveyor.

PART 2 – PRODUCTS

A. Re-injectable Tube: PVC tube of minimum ¾ inch outside diameter, consisting of solid core and lateral openings covered by neoprene strips, all banded by an open mesh, suitable for injection with resin grouts. The hose shall be equipped with color coded injection and ventilation ends, closure plugs and all necessary anchoring units. System FUKO Type I, by BBZ USA, INC. or an approved equal.

B. Junction Box: Plastic compatible with the tube system of necessary size to house injection and ventilation ends of the tube.

C. Remedial Grout: The remedial grout and grouting system shall be submitted to the Engineer for approval. The system shall be suitable for tunnel concrete construction and the contractor shall submit locations where the product was use successfully on other similar projects. Duroseal Inject 2000 bye BBZ or an approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. All work shall follow the recommendations of the manufacturer.

B. Junction boxes shall be located flush with concrete work, accessible after the completion of work and not visible from the public space. A key plan indicating the route for each tube and the location of the associated junction box shall be submitted with route numbers and boxes labeled as part of the concrete shop drawing submittal.

C. Tube routes shall be limited to 100 feet.

3.02 GROUT INJECTION

A. A representative of the manufacturer shall be on site for planning and execution of the first segment of grouting.

B. Establish injection pressure by means of on site demonstration and as recommended by the tube manufacturer.

C. Flush the tubes after grouting per the manufacturer's literature and repeat the grouting operation if leaks persist.

D. The grouting of routes may be deleted from the grouting operation at the discretion of the Authority.

E. The grouting operation shall be delayed as late as practical to allow the water table to reestablish itself.

PART 4 – MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement and payment will be made for re-injectable grout tubes; all costs in connection therewith shall be included in the price paid for the cast-in-place concrete to which the tube pertains.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

Under Subsection 1.01 revise Paragraph "A" and "B" to read as follows:

A. This Section specifies placing, curing, protecting and finishing cast-in-place concrete as indicated on the contract drawings and in accordance with Standard Specifications Construction Section 03300, except as modified herein.

B. Portland cement concrete is specified in Section 03310 and shall indicate class of concrete.

1. Classes of concrete are designated by numerals indicating the minimum 28-day compressive strength, in pounds per square inch as determined by ASTM C39, and the maximum permissible size of coarse aggregate.

2. Each class of concrete may consist of one or more mixes determined by the types of admixtures, special aggregates, or cements used.

3. Each mix within a Class shall be considered a specific type, requiring acceptance of the design mix.

F. Architectural Concrete is specified in Section 03350.

1.03 SUBMITTALS

Delete Subsection 1.03 in its entirety and replace with the following:

A. Product data for proprietary materials and items, including reinforcement and forming accessories, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by the Authority.

B. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Comply with Standard Practice for Detailing Reinforced Concrete Structures showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

C. Shop drawings for formwork indicating fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.

1. Engineer's review is for general architectural applications and features only. Designing formwork for structural stability and efficiency is Contractor's responsibility.

D. Samples of materials including names, sources, and descriptions, as follows:

1. Color finishes.

2. Reglets.

3. Waterstops.

4. Vapor retarder/barrier.

5. Form liners.

E. Working Drawings showing placement sequence. Show locations of construction, control and expansion joints, scheduled date for each separate placement, the anticipated rate of placing, and the mix designations for each placement including the Type of Cement to be used.

F. For each separate placement in the finished work, report the start and finish times of the placement and the actual ambient temperature readings as specified.

G. Certificates

1. Certified copies of mill test reports for each heat of reinforcing for each bar size showing chemical and physical test results.

2. Welding certificates as requested.

1.04 JOBSITE CONDITIONS

Under Subsection 1.04, revise Paragraph "A" to read as follows:

A. At least 24 hours prior to actual placement, notify the Engineer of the intention to produce and place concrete.

Under Part 1, General add Subsections 1.05 and 1.06 as follows:

1.05 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Deliver reinforcing bars to the fabricators in bundles, limited to one size, grade and length of bar, securely tied and identified with plastic tags in an exposed position identifying the mill, the melt or heat number, and the grade and size of bars.

B. After fabrication, bundle and tag reinforcing steel for identification at the job site. Provide tags identifying the steel by reinforcement item marking shown on accepted shop drawings and giving quantity of such items contained in the bundle.

1.06 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute ACI 301, "Specifications for Structural Concrete for Buildings."

2. American Concrete Institute ACI 318, "Building Code Requirements for Reinforced Concrete."

3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

PART 2 - PRODUCTS

2.01 MATERIALS

M. Reinjectable Grout Tubes, Section 3255

PART 3 - EXECUTION

3.07 REPAIR OF SURFACE DEFECTS

F. Where cracking occurs in the new concrete work, the following procedures should be adhered to:

1. Cracks through below grade exterior walls, roof slabs and base slabs shall be sealed in accordance with the requirements of section 03740, Structural Crack Repair By Epoxy Injection.

2. Cracks shall be sealed after construction movement is substantially stable and before the cracked surface is covered with waterproofing, pavement, or other construction. Cracks in the exterior walls shall be repaired prior to backfilling the wall.

3. Cracks shall be sealed:

    a. On the outer surface of exterior walls that are double-formed.
    b. On the top surface of roof slabs.
    c. On the top surface of base slabs.

4. Crack sealing materials shall be placed by skilled applicators under a supervisor or contractor with proven successful experience in applications of scope similar to the Contract. Crack sealing materials shall be applied when the concrete and the ambient air temperature are above 40 degrees F. If a heated enclosure is used to accomplish this, the heating device shall not be one that exhausts products of combustion within the enclosure, nor shall a combustion type be located within any tunnel or boat section.

5. Before containers of sealing material are opened, the labels shall be checked and the label information shall be documented. If multi-component systems are used, mixing shall be complete prior to application. Manufacturers' instructions shall be followed.

6. For all types, an initial demonstrated application shall be satisfactorily made in the presence of the Engineer before the application is continued.

7. Before application of the sealant, the crack shall be routed full length to form a V-shaped notch with a depth of between ¼ inch and 3/8 inch and a width of between 3/16 inch and 3/8 inch. The routed crack shall be cleaned with an air jet and a wire brush to remove dusts and loose particles.

8. The routed crack shall be filled with sealant by trowel or pressure gun. The sealant shall be tooled to ensure intimate contact with the joint sides and removal of trapped air and voids, and bought to a smooth surface flush with the concrete face.

3.08 FINISHING OF FORMED SURFACES

A. General

4. Where the type of finish for concrete exposed to view is not indicated, provide a smooth form finish.

5. Center waterstops in construction joints unless otherwise indicated. Secure waterstops in position by tie wire from loops to adjacent reinforcement.

6. Furnish key groove with key width one-third the thickness of the thinner member in which the key is placed and a key depth if 1 ½ inch, unless otherwise indicated. Used slightly tapered key groove forms to permit form removal without damage to groove after concrete has cured.

7. Clean key groove of laitance, curing compound, foreign materials, protrusions of hardened concrete, roughen and blow out debris and dust with oil-free compressed air.

Under Subsection 3.10.B; add new Subparagraph "4" as follows:

4. Premolded Joint Filler

a. Provide joint filler having some thickness as expansion joint width indicated.

b. Furnish maximum length filler to minimize field cutting.

c. Treat cut surface as recommended by manufacturer, when strips are cut.

d. Prevent disturbance of or damage to joint filler.

e. Fill joint completely.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Except where another basis of payment is indicated in other sections of these Specifications, each design mix of cast-in-place concrete will be measured by the calculated cubic yard complete in place, without deduction for chamfers, reinforcing steel and embedded items, and openings and recesses having an area of less than two square feet.

B. Waterstops, grout tubes, joint fillers, and expansion joints will not be measured separately for payment.

C. Additional concrete used to replace overcut or overbreak, or to repair or replace defective work, will not be measured for payment.

D. Crack repaired per section 3.07.F will not be measured separately for payment and shall be considered incidental to Cast-In-Place concrete.

4.02 PAYMENT Cast-in-place concrete will be paid for at the Contract unit prices for the quantities determined as specified above.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0330.073	4000 PSI, 3/4" AGGREGATE CONCCRETE	CY

END OF SECTION

SECTION 03310

PORTLAND CEMENT CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

Under Subsection 1.01, revise Paragraph A to read as follows:

A. This Section specifies Portland cement concrete, including materials, batching, mixing, delivering, testing and inspection in accordance with Standard Specifications Construction Section 03310, except as modified herein.

1.02 QUALITY CONTROL

A. Testing and Inspection Services

Under Subsection 1.02A, Paragraph A.6, add subparagraph "e" as follows:

6. Provide at no additional expense to the Authority all materials, labor, and services for sampling and testing required by the Engineer, including but not limited to:

e. Initial Curing: After molding, the specimens shall be stored in a temperature range between 60 to 80 ° F. (16 to 27° C.) and in a moist environment preventing any loss of moisture up to 48 hours. At all times the temperature in and between specimens shall be controlled by shielding from direct rays of the sun and radiant heating devices. Specimen that are to be transported to the laboratory for standard curing before 48 hours shall remain in the molds in a moist environment, until they are received in the laboratory, demolded and placed in standard curing. If specimens are not transported within 48 hours, the molds shall be removed within 24 ± 8 hours and standard curing used until transported. It may be necessary to create an environment during initial curing to provide satisfactory moisture and to control the temperature. The specimens may be immersed immediately in saturated limewater, and/or stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap, or in heavyweight closed plastic bags. Immersing in saturated limewater is not acceptable for specimens in cardboard or other molds that expand when immersed in water. Other suitable methods may be used provided the foregoing requirements limiting specimen temperature and moisture loss are met. The temperature may be controlled by ventilation, or thermostatically controlled cooling devices, or by heating devices such as stoves, light bulbs, or thermostatically controlled heating elements. Temperature record of the specimens may be established by means of maximum-minimum thermometers. Early age results may be lower when stored near 60° F. (16° C.) and higher when stored near 80° F. (27° C.).

B. Determination of Concrete Proportions

Under Subsection 1.02B, add Paragraph 6 as follows:

6. Concrete Mix Design

a. Design concrete mixes for each class of concrete required in accordance with ACI 301.

Design mixes based upon use of previous field experience or using trial mixtures. Do not design mixes on the basis of empirical data unless specifically approved by the Engineer.

b. Design mixes to comply with the requirements of Table 03310-A for each Class of concrete to be used, and with the additional special exposure requirements of ACI 318.

c. Low strength concrete fill shall conform to 1.02 B.6. above.

Under Section1.02, add subparagraph "F" as follows:

F. Frequency of Testing

1. Materials for Concrete

a. General: Periodic tests will be performed by an independent testing laboratory or the Authority's Materials Testing Laboratory for each of the materials used in concrete to confirm the continuous compliance with specified requirements.

b. Cement: Test for compliance to ASTM C150 for the type being used every 6 months.

c. Aggregates: Test for compliance to ASTM C33 every 12 months, except conduct tests for ASTM C289 every 6 months. Test for compliance to ASTM C330 every 12 months.

d. Admixtures: Periodic tests are not required. Manufacturer's submittals with admixture shipments will establish continued acceptability of admixtures.

e. Water: Periodic tests of water are not required provided concrete strength test results meet specified requirements.

f. Flyash: Test for compliance to ASTM C618 every 6 months.

g. Microsilica: Test for compliance to AASHTO M307 every 6 months.

2. Concrete Testing

a. The minimum number of test cylinders to be made for each class of concrete and or each placement will be three for each 100 cubic yards or fraction thereof and for each 5000 square feet of slab and wall surface areas or fraction thereof, for each mix design to be placed on each day. When additional sets of test cylinders are required beyond the normal seven and twenty-eight day tests, each set will consist of a minimum of two test cylinders for each age of testing beyond 28 days.

b. Test for slump, air content, and unit weight whenever specimens for compressive strength tests are made.

1.03 SUBMITTALS

Under Subsection 1.03A, revise to read as follows; add subparagraph "E".

A. Design Mixes: Submit mix designs as specified in Article 1.02.

1. Submit substantiating data for each concrete mix design to the Structural Engineer not less than four weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following:

   a. Mix identification designation (unique for each mix submitted).

   b. Statement of intended use for mix.

   c. Mix proportions, including all admixtures used.

   d. Manufacturer's date and/or certifications verifying conformance of all mix materials, including admixtures, with specified requirements.

   e. Wet and dry unit weight.

   f. Entrained air content.

   g. Design slump.

   h. Required average strength qualification data per ACI 301 3.9.1 and 3.9.2. Submit separate qualification data for each production facility which will supply concrete to the project.

   i. Average strength qualification data (trial mix or field test data per ACI 310 3.9.3). When field test data is used to qualify average strength, submit separate qualification data for each production facility which will supply concrete to the project.

   j. Field test data submitted for qualification of average strength under ACI 310 3.9.1, 3.9.2, and 3.9.3. shall include copies of the Concrete testing Agency's reports from which the data was compiled.

   k. Submit one copy of a representative concrete batch trip ticket containing information as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

Under Subsection 2.01 D, add subparagraph "4" as follow:

D. Aggregate

   4. Certify that no alkali reactivity is produced with the proposed aggregate-cement combinations when tested in accordance with ASTM C227.

Under Section 2.01 add subsections "E" and "F" as follows:

E. Flyash: Use as directed by the Engineer. Comply with ASTM C618, Type F. Limit use to not more than 25 % of cement content.

F. Microsilica: Use as directed by the Engineer. Comply with AASHTO M307. Do not use a dosage greater than 5 % by weight of cement per cubic yard of concrete.

Under Subsection 2.02 "B"; add the following:

2.02 MIXES

Under Section 2.02, add Subsection "H" and "I" as follows:

H. Water-Cement Ratio

1. Do not exceed a water-cement ratio of 0.50 for all concrete to be exposed to freezing and thawing.

2. Do not exceed a water-cement ratio of 0.45 for all concrete to be subjected to de-icers or required to be watertight.

3. Do not exceed a water-cement ratio of 0.40 for all concrete to be subjected to seawater.

4. The above-noted water-cement ratios are not applicable to low strength concrete fill.

I. Fly Ash/ Cement Replacement: Fly Ash, in proportions not greater than 25% by weight of the total amount of cementitous materials, may be used when accepted by the Structural Engineer. Cement content and/or water-cement ratio for mixes containing fly ash shall be based on the total weight of cementitous materials (Portland Cement plus fly ash).

Under Part 2, add Section "2.03" as follows:

2.03 CONCRETE BATCH PLANT REQUIREMENTS

A. Plant Requirements: Conform to "Certification of Ready Mixed Concrete Production Facilities (Checklist with Instructions)" of the National Ready Mixed Concrete Association.

B. Concrete Mix Requirements: Batch, mix, and transport concrete in accordance with ASTM C94 for both central and truck mixed concrete, as applicable.

PART 4 – MEASUREMENT AND PAYMENT

4.01 GENERAL. Portland cement concrete will be measured and paid for under the sections specifying construction requiring concrete.

END OF SECTION

SECTION 03340

CONCRETE TOPPINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section specifies concrete toppings on previously placed slabs, as indicated on the Drawings and as specified herein. Including but do not limit to:

1. Acrylic and Latex/cement floor underlayment and cement toppings.
2. Integrally color-conditioned concrete.
3. Concrete stain.
4. Concrete sealer.
5. Broadcast silicon carbide abrasive.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section.° Other Specification Sections that relate directly to work of this Section include, but are not limited to:

1. Section 03300, Cast-In-Place Concrete.
2. Section 07920, Sealants and Caulking.
3. Section 09300, Tile.

1.03 QUALITY ASSURANCE

A. Work shall be performed by firm with at least five years experience on comparable Projects, certified by concrete topping materials manufacturer.

B. Manufacturers shall provide evidence indicating that the specified materials have been used successfully utilized on work of similar scope to that shown and specified for this Project. Underlayment concrete examples cited shall have been completed and in use for two years without evidence of failure.

C. The Owner reserves the right to retain an independent testing laboratory to inspect the work. Neither presence of the testing laboratory, nor an observations and testing performed by the laboratory shall relieve the Contractor of his responsibilities for the Work.

1.04 SUBMITTALS

A. Samples: Submit duplicate 12 in. x 12 in. samples of cured concrete underlayment on 5/8 in. plywood backing.

B. Manufacturer's Review: Submit written signed statement, that Contract Documents have been reviewed by qualified representatives of the materials manufacturer, and that materials and system to be used for floor underlayment are proper and adequate for the applications shown.

C. Manufacturer's Data: Submit manufacturer's specifications and installation instructions for all products in concrete, including certifications and other data as may be required to show compliance with the Contract Documents.

D. Substrate Acceptability: Submit a certified statement issued by the manufacturer of concrete underlayment and topping materials and countersigned by installer, attesting that surfaces designated to receive underlayment concrete are satisfactory warranty requirements. Application of materials will be construed as acceptance of surfaces.

E. Statement of Supervision: Submit signed statement that field supervision by manufacturer's representative was sufficient to ensure proper application of materials and that the installation is acceptable to manufacturer.

F. Certification: Furnish certificate accompanying each delivery of concrete topping material indicating compliance with the Contract Documents.

G. Mock-Ups: Provide the following mock-ups as indicated and obtain Engineer's approval prior to proceeding the work of this Section.

1. Preliminary Mock-Up: Provide a free standing mock-up on plywood backing showing a typical cross-section of concrete floor topping including accent color banding, divider strips, control joints, sealer, coloring agent and abrasive. Preliminary mock-up shall be 4 -0" x 4 -0".

2. Final Mock-Up: Upon acceptance of preliminary mock-up the Contractor shall provide a field mock-up at a location acceptable to the Engineer. The field mock-up shall furnish all characteristics of the preliminary mock-up and shall be the standard for all work of this Section upon approval. Final mock-up shall be 10 -0" x 10 -0" and must include a representative floor area where a tapered installation is required.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers identified with brand, type, grade, date of manufacture, class, lot number, and other qualifying information.

B. Store materials in original sealed containers, in dry enclosed storage area, within temperature range recommended by manufacturer.

1.06 JOB CONDITIONS

A. Maintain manufacturer's current installation instructions at Project site.

B. Maintain interior building area above 50°F before, during, and after installation of concrete underlayment until structure and subfloor temperatures are stabilized.

C. Provide and maintain adequate ventilation until underlayment cures completely.

D. Coordinate application of concrete underlayment with work of other Sections.

1.07 PROTECTION

A. Protect adjacent surfaces and repair, restore, or replace soiled or damaged in performance of underlayment work.

PART 2 PRODUCTS

2.01 UNDERLAYMENT CEMENT

A. Latex flooring cement underlayment shall be a two-component acrylic modified Portland cement-based troweled-on material and primer system which will not deteriorate when exposed to water from cleaning equipment. Latex flooring cement underlayment shall meet the following:

1. Compressive Strength: (ASTM C-109) 7 days – 5000 psi, 28 days – 7000 psi.
2. Tensile Strength: (ASTM C-190) 28 days – 1000 psi.
3. Flexural Strength: (ASTM C-348) 28 days – 1500 psi.
4. Absorption: (ASTM C-67) 24 hour soak – 2.5% max
5. Density: 1.9
6. Loss by Abrasion: (Taber Abrader 400 cycles) – 1.8%
7. Bond Strength to Concrete: (ASTM C-321) Crossed brick method – Failure in concrete.

B. Latex Flooring Cement Underlayment: Subject to compliance with requirements provide products from one of the following or approved equal:

1. MASCO and C-21 primer by Silpro Masonry Systems, Inc.
2. B-1 Leveler and Primer 118 by W. R. Bonsal Company
3. Fastset Underlay and Sikabond primer by Quik Crete Products Corp.

2.02 ACRYLIC TOPPING CEMENT

A. Acrylic topping cement shall be a two-component acrylic modified Portland cement- based troweled-on material and primer which will not deteriorate when exposed to water from cleaning equipment. Acrylic topping cement shall meet the following:

1. Compressive Strength: (ASTM C-109) 1 day – 2500 psi, 7 days – 5500 psi, 28 days – 7500 psi.
2. Tensile Strength: (ASTM C-190) 28 days – 700 psi.
3. Flexural Strength: (ASTM C-348) 28 days – 1500 psi.
4. Density: 1.9
5. Bond Strength to Concrete: (ASTM C-1042) 28 days – 1500 psi.

B. Latex Flooring Cement Underlayment: Subject to compliance with requirements provide products from one of the following or approved equal:

1. Mascrete by Silpro Masonry Systems, Inc.
2. Sika 122 by Sika Corp.
3. Polytop by Ardex Engineering

2.03 ADMIXTURE FOR INTEGRALLY COLOR-CONDITIONED CONCRETE

A. All concrete topping designated as color 1 in the plans shall contain the proper proportion of CHROMIX admixture for color-conditioned concrete as manufactured by L. M. Scofield Company, Walpole, MA, 508-660-9899, or approved equal as manufactured by Hacros Pigments, Davis Colors, Solomon Grind-Chem or Specialty Concrete Products.

1. Color-conditioning admixture shall be a single-component, colored, water-reducing, self-controlling admixture, factory formulated and packaged in cubic yard dosage increments, not multiple additives and pigments added separately into the mix.
2. Admixture shall comply with ASTM C 494.
3. No calcium chloride shall be used.
4. Slump shall not exceed 4 inches.
5. All surfaces shall be finished uniformly.
6. Except for concrete to be stained (see 2.05 below), all colored concrete shall be cured and finished with a concrete sealer in the matching color and joints sealed with a traffic caulk in the matching color. All products shall be by the same manufacturer.
7. Concrete shall never be covered with plastic sheeting.
8. All mix design, batching, placing, finishing, curing, joint sealing and patching shall be in strict accordance with applicable technical bulletins as furnished by the manufacturer.
9. Color shall be as selected by Architect.

2.04 CONCRETE STAIN

A. All concrete designated as stained color 2 in the plans shall receive two applications of LITHOCHROME Chemstain Classic as manufactured by L. M. Scofield Company, Walpole, MA, 508-660-9899, or approved equal. Stain shall be a penetrating type which produces a chemical reaction with the concrete, so color becomes a part of the surface and will not fade, chip, crack or peel.

1. Stain shall not be applied until concrete has cured a minimum of 14 days.
2. Surface shall be prepared and stain shall be applied in accordance with Tech-Data Bulletin A-414 using recommended minimum coverage rate.
3. Color shall be as selected by Architect. Contractor shall submit the final stain color and application techniques on jobsite test samples to be approved by Architect prior to installation.
4. All chemically stained surfaces shall receive clear sealer as recommended by manufacturer after application of stain. Joints shall also be sealed with a traffic caulk in the matching color. All products shall be by the same manufacturer.

2.05 CONCRETE SEALER

A. Integral color-conditioned concrete shall be cured and sealed with LITHOCHROME Colorwax or COLORCURE Concrete Sealer, as manufactured by L. M. Scofield Company, or approved equal. Sealer shall match concrete color and shall be applied per manufacturer instructions and applicable technical bulletins.

B. Stained concrete shall be cured and sealed with CEMENTONE Clear Sealer or SCOFIELD Cureseal, as manufactured by L. M. Scofield Company, or approved equal. Sealer shall be applied per manufacturer instructions and applicable technical bulletins.

2.06 SILICON CARBIDE ABRASIVE

A. Group graded, medium density, black, silicon carbide abrasive complying with the following:

1. Crystallography: Alpha silicon carbide in the hexagonal and rhombohedral class of the hexagonal system.
2. Knop 100 Hardness: 2480
3. Bulk Density: ANSI B74.4 – 1988 (gm/cc)
4. Grit size: 16 / 30 blend.
5. Application: 20 lbs per 100 square feet.

PART 3 EXECUTION

3.01 CONDITION OF SURFACE

A. Examine the substrates, adjoining construction and conditions under which the Work is to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Pre-Installation Meeting: Prior to installation of materials, meet at the Project site to review the material selections, installation procedures, and coordination of the Work with work of other sections. Meeting shall include the Engineer, Trade Contractor, Subcontractor, manufacturer's representatives, inspection and testing services (if any), and any other subcontractor whose work requires coordination with this work.

C. A minimum ambient temperature of 50 degrees F shall be maintained for a sufficient time before application to assure that the building and the substrate temperatures have stabilized and such temperatures shall be maintained during and after underlayment and topping application. Provide continuous heat and adequate ventilation to remove moisture from the area until the flooring has cured. Curing procedures shall conform to manufacturer's recommendations.

D. Surfaces to receive the flooring shall be structurally sound and clean, free of mud, oil, grease, or other contaminants. Provide the required final cleaning just prior to beginning of installation.

E. Thoroughly examine all surfaces to receive work of this section and submit written documentation of all conditions which would adversely affect this work. Do not commence work in areas where such notice of adverse conditions has been sent until corrective work has been completed. Starting work in area without issuance of such notice shall constitute acceptance of conditions in the area as suitable to properly receive the work of this section.

3.02 APPLICATION

A. Materials and application shall conform in all respects to manufacturer's published specifications of installation instructions carried out by highly skilled workmen thoroughly experienced in application of these materials.

B. Apply primer to substrates by method and at a rate recommended by manufacturer.

C. Install cementitious materials in a manner to provide complete leveling of the overall substrates, spreading and screeding to a smooth surface, and feathering out edges to sound, clean surfaces. Applications shall be smooth and level to within a tolerance of 1/8 inch when measured with a 10 foot straight edge. Apply continuously and in such a manner that no cementitious flooring is placed against flooring that has obtained its final set.

D. Maintain expansion joints which occur in substrates.

E. Acrylic cement topping shall be used for 3 inch to 1 1/2 inch flooring with crushed stone (1/8 inch to 3/8 inch). Acrylic cement topping shall be for 1 1/2 inch to 1/8 inch flooring without crushed stone. Latex flooring cement underlayment shall be used for 1/2 inch to featheredge flooring. Prepare and combine products in strict accordance with manufacturer's instructions.

F. Apply silicon carbide abrasive at the rate indicate once concrete has been screeded. Do not begin installation until concrete has set to adequate strength to support workmen standing or kneeling on wood boarding. Sprinkler abrasive evenly across concrete surface and tamp particles into concrete surface. Do not overtamp or bury abrasive in concrete surface.

G. Apply concrete stain where shown and as specified in subsection 2.04 above. Strictly comply with manufacturer's application instructions.

F. Apply concrete sealer at all topping slabs as specified in subsection 2.05 above. Strictly comply with manufacturer's application instructions. Protect all adjacent areas from over spray.

3.03 CLEANING

A. Remove smears from adjacent surface immediately as the work progresses. Exercise care to prevent staining or smearing of surrounding surfaces which will be exposed in the finished work, and repair damage done to same as a result of this work without additional cost to the Authority.

B. As work progresses remove rubbish and debris resulting from work of this section and leave the work area neat and clean.

C. Restore and replace work damaged by work of this section.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

Item No.	Payment Item	Unit
0335.000	Specially Finished Concrete	Lump Sum

-END OF SECTION-

WATER REPELLENT PENETRATING SEALER

SECTION 03372

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the furnishing and application of a water repellent penetrating sealer for weatherproofing cast-in-place concrete slabs and vertical wall surfaces as required and as shown on the Drawings.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01300, except as modified herein.

B. Manufacturer's Descriptive Brochures

1. Submit manufacturer's literature and data sheets describing product, include storage and handling instructions and coverage rates.

C. Laboratory Test Data

1. Submit laboratory test data from a qualified independent testing laboratory substantiating that the product meets all the performance standards and qualifications of this specification.

D. Installations Instructions

1. Submit manufacturer's instructions for application of product including equipment.

E. Contractor's Application Procedures

1. The Contractor shall document, in writing, the procedures used in the preparation of the specified test areas. The Contractor shall include the following information, at a minimum.

   a. Environmental conditions, including temperature, relative humidity, wind conditions and sun exposure.

   b. Penetrating sealer material used, including number of applications and method of application.

   c. Equipment used, including application pressure.

   d. Accessory materials used.

1.03 QUALITY CONTROL

A. Quality control shall be in accordance with Section 01400, except as modified herein.

B. Applicator Qualifications

1. Installation shall be by an applicator approved by the manufacturer of the materials supplied.

C. Requirements of Regulatory Agencies

1. Materials and installation thereof shall meet the public health, safety and environmental requirements of all local, state, and federal codes, regulations, and ordinances.

D. Tests and Approvals of Applications to Concrete and/or Masonry Areas: The fundamental consideration for selection of appropriate procedures shall be that the materials and techniques adopted achieve the desired results.

1. Test areas shall be as selected by the Engineer for his inspection and approval of the appearance of the finish application, uniformity of coverage and effectiveness as water repellent sealer. Effectiveness as water repellent sealer will be judged on the basis of whether water splashed on the surface forms beads or droplets of water.

2. Testing shall be conducted on each surface exposure to be treated in an unobtrusive location under representative conditions. Testing shall include, but not be limited to, the cleaning and other surface preparation techniques proposed for the overall project followed by the application of the specified treatment employing the proposed application procedures and coverage rates.

3. Adjacent surfaces not to be treated shall be tested for possible detrimental effect or aesthetic alteration created by exposure to the specified treatment and shall be protected as determined necessary. Test procedures shall include evaluation of materials and techniques proposed for protection of surrounding and adjacent non-sealed surfaces from the penetrating sealer treatment.

4. A representative of the manufacturer of the penetrating sealer shall be present during preparation and application of test areas. Completed and approved test areas will serve as the standards by which subsequent work in this Section will be evaluated for approval by the Engineer.

E. The Contractor and applicator shall inspect the surfaces to receive the water repellant penetrating sealer for surface conditions unsuitable for the application of the sealer.

1. Additional work to prepare the surfaces to an acceptable condition for the application of the sealer shall be performed by the Contractor at no additional cost to the Authority.

1.04 DELIVERY, HANDLING, TRANSPORTATION, STORAGE AND HANDLING

A. Delivery, handling, transportation, storage and handling shall be in accordance with Section 01600, except as modified herein.

B. Deliver materials to the site in original packages or containers bearing the manufacturer's labels and identification.

C. Store and handle materials to prevent inclusion of foreign matter and water and deteriorating effects of hot and cold temperatures in accordance with the manufacturer's instructions.

1.05 JOB CONDITIONS

A. Environmental Requirements

1. The work of this Section shall not be conducted at surface and air temperatures below 40 degrees F or above 100 degrees F. Work shall not be conducted when there is a chance of the surface temperature falling below 40 degrees F in the 24 hours following application.

2. The water and oil repellent treatment shall not be applied during rain to wet surfaces or when there is a chance of rain within 24 hours after application. After treatment, surfaces should be protected from rain for not less than 24 hours.

3. The water and oil repellent shall not be applied when winds are sufficient to carry airborne chemicals to unprotected surfaces.

1.06 MATERIAL SUBSTITUTION

A. Variations from Materials Specified

1. Should the Contractor wish to use a brand or type of material other than that specified, he shall so state in writing to the Engineer naming the proposed substitution and manufacturer. The statement shall be accompanied by:

   a. A certificate of compliance from an approved independent testing laboratory that the proposed substitute meets or exceeds the specified requirements and has been tested in accordance with the specified test standards.

   b. Documented proof that the proposed brand or type of material has a proven record of performance when used in the intended application as confirmed by actual field tests and successful installations in place of at least 5 years.

   c. Certification that if two or more types of products are intended to be used as part of a system, they shall be supplied by the same manufacturer so as to ensure compatibility of materials and to maintain single-source manufacturer responsibility.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Water repellent penetrating sealer for horizontal and vertical masonry surfaces shall be a clear, colorless, low viscosity liquid based on special class of neat alkyltrialkoxy silanes formulated for low pressure spray application. The product shall have a very small molecular structure to allow for maximum penetration (up to 1 inch) into the concrete or masonry surface. Material shall not form a film or gloss and treated materials shall maintain their natural appearance, vapor permeability, slip resistance, and other surface characteristics.

1. The penetrating sealer shall comply with regulations limiting the volatile organic content of architectural coatings and sealers. Volatile organic content (VOC) of the product shall not exceed 380 grams per liter.

B. Penetrating sealer shall be Dynasylan BH-N as manufactured by Hules America Inc., SL 100 as manufactured by ProSoCo, Inc., Sil-Act ATS 100 as manufactured by Advanced Chemical Technologies or approved equal. Penetrant/Sealer shall exhibit the following physical properties or equivalents, minimum values:

1.	Actual substance:	Alkylalkoxysilane
2.	Active content:	100 percent
3.	Form:	clear liquid
4.	Specific gravity:	0.909, minimum
5.	Flash point:	57 degrees F
6.	Weight per gallon:	7.3 pounds to 7.67 pounds
7.	VOC:	less than 380 grams/liter

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. General Preparation

1. Caulking, patching and joint sealants shall be installed prior to application of the sealer and allowed to cure.

2. Traffic marking paints shall be pretested for compatibility.

3. Concrete and masonry surfaces shall be cleaned free of dust, surface dirt, oil, efflorescence, and contaminants.

4. Surfaces to be treated shall be clean and absorbent to assure easy penetration of the sealer.

5. New concrete surfaces shall be thoroughly curd prior to application.

6. Protect surrounding non-masonry/non-concrete surfaces, and surfaces not designated for treatment from contact with the penetrating sealer treatment.

   a. Non-masonry/non-concrete surfaces, wooden and/or painted surfaces, and polished stone shall be protected with sheets of polyethylene or other proven protective materials firmly fixed and sealed to the surface.

      1) Only materials tested and approved during tests and approvals of applications shall be used.

   b. Provide for the removal and subsequent reinstallation of surface mounted items where practical. Where not practical, such items shall be protected in place.

c. Prevent overspray of the penetrating sealer treatment caused by wind drift.

B. Cleaning of Unsuitable Surfaces

1. The appropriate cleaning materials recommended by the waterproofing manufacturer shall be used in conjunction with high pressure water, either cold or warm, for cleaning the concrete or masonry.

2. The surface designated for treatment shall be clean and free of foreign matter to ensure penetration of the penetrating sealer. The surface may be slightly damp at the time of treatment.

3.02 APPLICATION

A. Apply water repellent penetrating sealer in accordance with the manufacturer's instructions.

B. Penetrating sealer shall be applied as packaged. Do not dilute or alter material.

C. Preferred method of application shall be with low pressure 20 psi airless spray equipment or with a heavily saturated brush or roller. Sprayer shall be fitted with solvent resistant hoses and gaskets. When using brushes or rollers, care shall be taken to assure that enough solution is applied. Apply sufficient material to thoroughly saturate the surface making sure to brush out excess material that does not penetrate.

1. Flat Surfaces: When applying to flat surfaces, sealer shall be applied in a single saturating application with sufficient material applied so that the surface remains wet for 1 to 2 minutes before penetration into the concrete. Surface residues, pools, and puddles shall be broomed out thoroughly until they completely penetrate into the surface.

2. Vertical Surfaces: When applying to vertical surfaces, the penetrating sealer shall be applied in a single saturating application. Apply from the bottom up with sufficient material to thoroughly coat the surface and create a slight rundown below the spray pattern. Apply uniformly and avoid heavy application.

3. Overhead Application: Two applications, 10 minutes apart, low pressure 20 psi airless spray.

D. Protect treated surfaces from rain for not less than 24 hours following application.

E. Treated surfaces shall be allowed to cure a minimum of 24 hours prior to being exposed to traffic or additional work.

3.03 COVERAGE RATES

A. Coverage rates shall be as determined during tests and approvals of applications to concrete and/or masonry surfaces.

B. Porosity and texture of the concrete surface will affect the amount of material necessary for effective treatment. The following coverage rates are provided for estimating purposes and shall be confirmed through actual test applications.

Horizontal Surfaces

Material/Finish	Coverage Rate
Concrete - Broom Finish	150-200 sq. ft./gal.
Concrete - Smooth	175-250 sq. ft./gal.

Vertical Surfaces

Material/Finish	Coverage Rate
Architectural Precast	225-275 sq. ft./gal.
Form Finish Concrete	225-250 sq. ft./gal.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement nor payment will be made for the work required under this Section, but all costs therefore shall be included in the item of work to which it pertains.

END OF SECTION

SECTION 03603

EPOXY BONDING COMPOUND/GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing two-component epoxy-resin system for bonding of structural materials and for grouting the existing concrete tunnel roof slab repairs, tunnel wall repairs, construction of new platform walls, and base slab at elevator pits, reinforcing steel, anchor bolts, and base plates in accordance with Standard Specifications Section 03603, except as modified herein.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement nor payment will be made for epoxy bonding compound/grout; all costs in connection therewith shall be included in the prices paid for the cast-in-place concrete to which the bonding compound/grout pertains.

END OF SECTION

SECTION 03604

NON-SHRINK CONSTRUCTION GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the furnishing and installing of non-shrink construction grout at locations as shown on the Plans and in accordance with Standard Specification Section 03604, except as modified herein.

PART 2 - PRODUCTS

2.01 GENERAL

B. Provide non-metallic cement based grout requiring only addition of water with shrinkage compensation characteristics in both the plastic and hardened states, conforming with ASTM C1107, "Grade C", CRD-C621-91, and to the following performance requirements listed in Article 2.02 when tested at the moderate fluidity, flowable, level.

D. One of the following grouts, or Engineer approved substitute, may be used:

1. "Five Star Grout 100 by Five Star Products Inc."

2. "SikaGrout 212 as manufactured by Sika Corporation."

3. "Masterflow 928 by Master Builders, Inc."

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement will be made for non-shrink grout. All costs in connection therewith shall be included in the prices paid for the items of work to which it pertains.

END OF SECTION

SECTION 03610

CONCRETE CRACK SEALING WITH INJECTED WATER-REACTIVE POLYURETHANE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies furnishing and installing a sealing system with a single component injected water-reactive non-shrink polyurethane grout to arrest water infiltration of joints, cracks, fractures and holes in non-structural concrete (as defied below), and the repair of expansion joints.

B. Non-structural concrete is definedas concrete that is NOT part of tunnel roof, walls, and platform slab or which acts directly as main load carrying concrete contributing to the overall structural integrity of the tunnel.

C. The work in this section is work shall be performed only at locations as directed by the Engineer, and includes such locations as lean concrete fill above the tunnel structure, or in areas where excessive water infiltrations must be arrested prior to the repair of structural concrete by means of epoxy injection.

D. The contractor shall furnish, at no additional cost to the Owner, the services of a manufacturer approved technical field representative to insure proper injection of the water-reactive polyurethane grout.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all of the Contract Documents for requirements that affect the work of this section.

B. Other sections that directly relate to the work of this section include, but are not limited to, the following:

1. Special provisions for limitations in work hours and other security requirements.
2. Appendix A: Details of Repairs.
3. Appendix B: Tabulation of quantities and locations of the work.

1.03 QUALITY CONTROL

A. Manufacturing Qualifications

1. The manufacturer of the specified product shall:
   i. Have an established program of training, certifying, and technically supporting a nationally organized Approved Contractor Program.
   ii. Have domestically produced the specified product for a minimum of ten years.
   iii. Maintain and be able to provide proof of Product Liability Insurance in an amount of not less than one million dollars.

B. Contractor Qualifications

1. Contractor shall be an Approved Contractor of the manufacturer of the specified product, who has completed a program of instruction in the use of the specified repair material, and provide certification from the manufacturer attesting to their Approved Contractor status. Contractor shall be able to demonstrate past performance on at least five jobs of similar scope and size.

C. Manufacturer's Representative

1. Make all arrangements and pay all costs to have manufacturer's authorized Technical representative on the job at the beginning of all major phases of the work, Including joint preparation, and installation of polyurethane grout, to advise installer of the proper procedures and quality control techniques.

1.04 SUBMITTALS

A. Product Data

Submit manufacturer's product data, installation instructions, use limitations and recommendations for polyurethane grout material used and for all other associated materials as requested by the Engineer. Grout materials shall be non-flammable and non-toxic when cured.

B. Provide a certificate of compliance stating that the repair material meets the specified requirements. Provide the manufacturer's current printed literature on the specified product.

C. The Contractor shall submit a complete list of equipment and procedures for the proposed sealing of concrete cracks, holes fractures and joints.

D. The Contractor shall submit to the Engineer for approval a detailed procedure for the installation of the water reactive polyurethane grout.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers

B. Store the specified product in a condition as recommended by the manufacturer.

1.06 JOB CONDITIONS

A. Environmental Conditions

Store dry at 50-90 degrees F. Material shall be 65-85 degrees F before using. Protect against freezing. Discard frozen material.

B. Protection

Precautions should be taken to avoid damage to any surface or utilities, such as water pipes, conduits, or any mechanical or electrical systems on the site.

PART 2 – MATERIALS

2.01 POLYURETHANE WATER-REACTIVE CHEMICAL GROUT

A. The grouting material shall be a single component low viscosity hydrophilic polyurethane liquid. The grout shall be a water reactive single component polyurethane grout, developed to stop highly active leaks. The grout shall be nontoxic after curing. The polyurethane liquid shall react with water to foam and expand to form a flexible, tough, rubber type gasket that stops water.

B. Product Properties of the Uncured Polyurethane Chemical Grout

	Property	Standards	Result
1.	Solids Content:	ASTM D 2369 Method B	82 – 88%
2.	Viscosity:	ASTM D 2196 Method A	300-800 cps
3.	Color:	Visual	Amber
4.	Weight per gallon:	ASTM D 3475-95	9.15 Lbs.
5.	Flash Point (Pensky Martens)	ASTM D 93	>200 deg. F

C. Product Properties of the Cured Polyurethane Chemical Grout

	Property	Standards	Result
1.	Density:	ASTM D 3574-95	8.7-9.2 Lbs/gal
2.	Tensile Strength:	ASTM D 3574-95	380 psi
3.	Elongation:	ASTM D 3574-95	400%
4.	Shrinkage:	ASTM D 756 ASTM D 1042	<10% linear
5.	Toxicity:	ANSI/NSF 61-1999	Compliant

D. Packers are required for injection. Packers for injection shall be supplied from the manufacturer.

E. Hoses: Moisture impermeable hoses are required for use where grout material is being pumped.

F. Expansion Joint Backer rod: The expansion joint backer rod shall be cross linked open cell polyurethane foam with a rectangular or circular cross section as manufactured by Polytite or Schul of Cambridge MA. or Denver Foam of Denver Colorado. The cross section of the cross-linked open cell polyurethane foam shall be a minimum 150% of the width of the joint as measured between the cleaned concrete surfaces.

G. Surface Sealant: The surface sealant for the expansion joints shall be a polyurethane joint compound similar to Sikaflex 1A. The sealant shall be gray in color.

PART 3 – CONSTRUCTION METHODS

3.01 SURFACE PREPARATION

A. The cracks, holes, cold joints and fractures shall be clean, and sound. Remove dust, laitance, grease, curing compounds, waxes, impregnations, foreign particles, coating, efflorescence, rust stains and disintegrated materials from the defects by wire brushing and scraping or mechanical means as approved by the manufacturer. All cracks, fractures, holes, joints, etc. shall be thoroughly flushed with clean water to remove dirt, dust and other contaminants. If joints or cracks that are being sealed are dry, water shall be pumped into the cold joint or crack before injecting grout.

B. Expansion joints to be repaired shall have all temporary drain gutters removed prior to surface preparation. The expansion joints shall be clean and sound. Remove all dust laitance, grease, curing compounds, waxes, impregnations, foreign particles, coatings, efflorescence, rust stains, fiber filler and any other unsuitable material which will inhibit bond to the dimensions shown on the drawings.

C. Repair cracks and cold joints by drilling offset test holes at a distance from the defect of _ the depth of the concrete, at an angle sufficient to intersect the defect at approximately half the distance of the concrete. Injection hole spacing is normally 7 inches or up to 25 inches apart depending upon the width of the defect. Generally the wider the defect, the greater the distance of grout travel; therefore, the injection holes will be farther apart. The purpose of the test holes is to pump water into the crack or cold joint to determine spacing for injectors along the crack. Drill the holes to intersect the crack or cold joint midway through the substrate. Install the injection packers in holes and tighten. If the defect to injected is _" or greater at the surface, use oil free oakum saturated with grout and mixed with water. Hold oakum for 2 to 3 minutes to allow foaming and insert oakum into defect, hole or cold joint. Water should be sprayed into area before inserting activated oakum.

D. For thin concrete walls of 6" or less, the injection holes should be drilled directly into the defect itself to prevent damage to the concrete.

E. The expansion joints shall be repaired by the insertion of the cross linked open cell polyurethane foam backer rod saturated with the polyurethane grout into the expansion joint as shown on the plans. The selection of the backer rod cross section is to be performed after the joint is cleaned and measured. The backer rod cross section is to be 150% larger than the cross section of the open cleaned expansion joint.

3.02 APPLICATION

A. Installation Procedure Crack Injection

1. This grout requires no mixing.

2. Injection Method: The injection equipment shall be used to meter the polyurethane chemical grout and dispense the product into the prepared crack, hole or joint. The unit shall be portable and be equipped with positive displacement type pumps that are multi ratio or plural component with adjustable fittings to provide positive control of the polyurethane chemical grout at the nozzle. The pumps shall be air powered or electric and shall provide an in-line metering system.

3. Follow manufacturer's recommendation for the use of safety equipment required for the handling and storage of the polyurethane grout.

B. Injection of Grout

1. Basic steps for crack or joint repair are as follows:
   a. Clean area to be grouted.
   b. Drill holes for gout injection.
   c. Flush defect with water.
   d. Grout injection.
   e. Remove injectors.
   f. Patch injector holes.
   g. Remove excess surface grout.
   h. Apply a surface sealer to defect surfaces.

2. Flush the crack to be injected with clean potable water prior to the installation of the grout. Observe the return of the water from the surface of the crack prior to the moving to the next injection port for water flushing. If the crack is contaminated with dirt or efflorescence, flush with a mixture of 5% muriatic acid and water. The entire crack must be flushed with clean water prior to the injection of polyurethane grout.

3. Pump polyurethane chemical grout at 250 to 1500 psi into or behind fissures or into voids, which are allowing water to infiltrate into unwanted areas. If concrete being injected contains insufficient moisture to activate the grout, inject the defect with water prior to injecting the polyurethane chemical gout.

4. Pump polyurethane chemical grout for 45 seconds and then pause to allow the material to flow into all of the cracks and crevices. Watch for material flow and water movement to appear on the surface. When movement stops, begin injection into the next packer. When sealing vertical cracks, begin at the bottom of the crack and work vertically Re-inject as necessary to assure that all voids are properly sealed off.

5. Caution: Adhere to all manufacturers' caution notes appearing in product literature including:

a. The review of drawings of the areas to be repaired.
b. Minimum substrate temperature shall be 40 degrees F: minimum material temperature, 60 degrees F.
c. All equipment in contact with grout shall be dry.
d. The cured material has a 400% elongation.

C. Repair of Expansion Joints

The repair of the expansion joints shall be performed in the following manner:

Clean the concrete surface of all of the existing sealant, backer rod and fiberboard filler to the dimensions shown on the drawings. The cleaning shall be performed using brushes, chippers and other suitable equipment to provide a clean sound concrete surface for the polyurethane grout to bond.

The cross-linked open cell polyurethane backer rod is to be soaked with water and wrung out to remove all excess water. Once wrung out the cross linked backer rod is to be soaked with Polyurethane grout in a bucket or other suitable container.

After the backer rod is saturated with the polyurethane grout, it is to be inserted into the expansion joint as shown on the drawings, to a depth of at least four times the width of the joint.

If required, after insertion into the expansion joint, the saturated backer rod is to be sprayed with a water mist to enhance the catalization of the polyurethane grout.

After the polyurethane grout has cured, repeat the procedure with a second cross-linked open cell backer rod installing it just below the face of the joint. An open space between the two backer rod installations of at least two times the width of the joint should be maintained.

Allow both polyurethane backer rods to cure completely.

After curing is complete, use an injection needle to penetrate the cured polyurethane soaked backer rod at the face of the joint to allow injection of the void between the two backer rods.

Pump polyurethane grout and water at a 1:1 ratio into the void. Do not allow injection pressures to exceed 350 psi.

After all the polyurethane grout has cured, the concrete surfaces must be cleaned and dried to provide a bonding surface for the joint sealant to be placed over the backer rod.

The surface of the expansion joint shall be sealed with an elastomeric joint compound as recommended by the manufacturer. The joint sealant shall be concrete gray in color.

3.03 CLEANING

A. Clean-up

Completely flush pump and hoses with polyurethane chemical grout pump flush. Use a sharp-sided tool such as a putty knife or trowel to remove excess material from walls, floors, etc. Wait for material to cure before removing. May be sanded off if necessary.

B. The uncured polyurethane chemical grout can be cleaned from tools with an approved solvent. The cured polyurethane chemical grout can only be removed mechanically.

C. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

D. The contractor shall take steps to protect all existing surface around and near the joint. Drop clothes, masking, and coverings shall be used to prevent polyurethane grout from getting on finished surfaces.

3.04 MANUFACTURE'S FIELD REPRESENTATIVE

A. The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to start of grouting work to instruct the work crews in the proper application procedures. He shall remain at the job site after work commences and continue to instruct until he and the Contractor and Engineer are satisfied that the crew has mastered the technique of installing the system successfully. The representative shall make periodic visits to the project as the work progresses and shall confer on each visit with the Contractor or Engineer.

B. The manufacturer's field representative shall be fully qualified to perform the work and shall be subject to the approval of the Engineer.

PART 4 – COMPENSTAION

4.01 MEASUREMENT

A. The repair of leaking cracks shall be measured by the lineal foot of repaired crack, complete in place.

B. The repair of expansion joints shall be measured by the lineal foot in place and the quantity to paid for shall be the lineal feet actually placed and successfully repaired and sealed for a period of 6 months after installation.

4.02 PAYMENT

A. The repair of leaking cracks will be paid for at the contract unit bid price per lineal foot of repaired crack, complete in place, including all preparation, materials, labor, tools, equipment, cleanup, and all other incidentals necessary to complete the work.

B. The repair of expansion joints will be paid for at the contract unit bid price per lineal foot listed below, which payment shall be full compensation for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified work.

4.03 PAYMENT ITEM

Item No.	Item Description	Unit
0354.004	Grouting	Linear Foot
0790.075	Expansion Joint Repair –Type A	Linear Foot

END OF SECTION

SECTION 03740

STRUCTURAL CRACK REPAIR BY EPOXY INJECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the repairs of cracks or voids in Structural Concrete by penetration of epoxy adhesive, in accordance with Standard Specifications Section 03740, as noted on the Contract Drawings, and as directed by the Engineer, except as modified herein.

B. Structural Concrete is defined as all concrete members in tunnel roof, walls, and platform slab which act directly as main load carrying members contributing to the overall structural integrity of the tunnel. This includes concrete encased beams and columns and all concrete with contiguous exterior waterproofing membrane. For all other concrete crack repairs in non-structural concrete, such as lean concrete fill, the requirements of Section 3610 shall apply.

C. Structural Crack Repair by Epoxy Injection shall be of two types, each with two sub-types of narrow and wide crack repair:
   1. Overhead and vertical cracks and
   2. Horizontal surfaces.

D. Narrow crack repairs shall be defined as less then 1/8 of an inch. Wide crack repairs shall be 1/8 of an inch or larger.

1.06 RELATED SECTIONS

1. Section 03300, Cast-In-Place Concrete
2. Section 03610, Concrete Crack Sealing with Injected Water-reactive Polyurethane.

PART 2 – PRODUCTS

2.01 EPOXY

A. Epoxy to be used for Structural Crack Repair by Epoxy Injection shall be a two-component, non-solvent, low-viscosity epoxy adhesive system containing a minimum of 100% solids with no dilutents, wetting agents or volatile solvents, and shall be capable of being injected under pressure into cracks as specified herein, to their full depths, complying with ASTM C881, except as specified herein.

B. Physical Characteristics: The following are the required properties of the cured materials for narrow and wide cracks at 77 degrees F:

1.	Compressive Yield Strength ASTM D695, 7 days @ 70 degrees F	12,000 psi minimum
2.	Elongation at Break ASTM D638, 7 days @ 70 degrees F	9% maximum

3.	Viscosity	40 cps (for narrow crack repair epoxy material) Smooth Gel consistency (for wide crack repair epoxy material)

C. Epoxy to be used for sealing the surface of the crack prior to injection shall be a two-component, non-solvent, low-viscosity epoxy adhesive system containing a minimum of 100% solids with no dilutents, wetting agents or volatile solvents, and shall be capable being mixed and spread across the surface of the crack and complying with ASTM C881, except as specified herein.

D. Physical characteristics for fast setting crack surface treatment gel, to be used prior to epoxy resin injecting for larger cracks, shall conform to the following:

1.	Flexural Strength: ASTM D790	4,000 psi minimum
2.	Tensile Strength, ASTM D638	6,000 psi minimum
3.	Compressive Strength, ASTM D695	10,500 psi minimum
4.	Elongation at Break, ASTM D638, 7 days At 70 degrees F.	1%
5.	Bond Strength ASTM C321, 6 hours at 70 degrees F.	2,500 psi minimum
6.	Viscosity	Non-sagging Gel

E. If a longer pot life is required, the physical characteristics for the surface treatment gel, to be used prior to epoxy resin injecting for larger cracks, shall conform to the following:

1.	Flexural Strength: ASTM D790	500 psi minimum
2.	Tensile Strength, ASTM D638	2,400 psi minimum
3.	Compressive Strength, ASTM D695	2,500 psi minimum
4.	Elongation at Break, ASTM D638, 7 days At 70 degrees F.	50%

5.	Bond Strength ASTM C321, 6 hours at 70 degrees F.	500 psi minimum
6.	Viscosity	Non-sagging Gel

PART 3 - EXECUTION

3.03 PREPARATION

C. For crack widths greater than _" a fast setting epoxy gel shall be applied to the surface of the crack to seal the gap prior to injecting epoxy resin materials.

D. For cracks that exhibit excessive water leakage, the leakage shall be arrested prior to epoxy injection. This shall be performed in accordance with Section 03610, Concrete Crack Sealing with Injected Water-Reactive Polyurethane. The water reactive grout shall be injected to the far face of the crack, and if possible, through to the adjacent soil and waterproofing area of the crack. Penetration of the water-reactive grout into the crack depth shall be minimized so as to allow the deepest possible penetration of the structural epoxy injection after the water-reactive grout has cured.

E. For all overhead and vertical cracks regardless of width, a fast setting epoxy gel shall be applied to the surface of the crack to seal the gap prior to injecting epoxy resin materials.

F. All preparation of the injected areas shall be done in accordance with the products manufacturer's recommendations.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASURMENT. Structural Crack Repair by Epoxy Injection for wide and narrow crack repairs, for horizontal, vertical and overhead cracks, the repair will be measured per linear foot of repaired crack, complete in place, including all preparation, materials, labor, tools, equipment, cleanup, and all other incidentals necessary to complete the work, except where excessive water leakage is observed and a water-reactive grout material is used to arrest the water flow, which will be paid for separately as described in Section 03610. Sealing the surface of wide, overhead and vertical cracks with a fast setting crack surface treatment gel will be considered incidental to Item 0354.001.

4.01 PAYMENT. Payment for Structural Crack Repair by Epoxy Injection will be made at the Contract unit price as measured above.

4.03 PAYMENT ITEMS

Item No.	Item Description	Unit
0354.001	STRUCTURAL CRACK REPAIR BY EPOXY INJECTION	LF

END OF SECTION

SECTION 04100

MORTAR AND GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and mixing of mortar and grout for masonry work, in accordance with Standard Specifications Construction Section 04100, except as modified herein.

B. Work includes furnishing and mixing all mortar for CMU masonry work.

PART 2 - PRODUCTS

2.02 MORTAR MIXES

B. Reinforced Masonry Mortar: Reinforced masonry mortar for reinforced CMU shall conform to ASTM C 476. All other reinforced masonry mortar and brick mortar shall conform to ASTM C 270 Type M mortar with f'm=2500 psi, and tested in accordance with ASTM C 91, and compressive test in accordance with Section 3 of ASTM C 109. Two samples consisting of three specimens each shall be taken each day, and also when there is any change in mix proportions, materials used, or in the method of mixing.

1. Prior to use of mortar in the Work, establish an acceptable mortar using available acceptable materials; include prism test ASTM C 140.

F. Mortar Colors: Provide mortar colors as selected by Engineer from manufacturer's standard choices, or provide custom colors as required. Where masonry is hidden from view, or where masonry is indicated to be painted, provide standard gray color.

2.03 GROUT MIXES

C. Grout for hollow concrete masonry units shall be in accordance with ASTM C 476 and tested in accordance with ASTM C 39 with a 28 day strength of f'c of 4000 psi. One three sample test shall be taken each working day, and each time that there is a change in material supplier. The grout proportions by volume with a 10 percent variance shall be as follows:

705	lb. Type No. II Portland Cement
1900	lb. Sand
900	lb. 3/8 inch size gravel
52.5	gallons of water
52.5	oz. water reducing agent

D. All grout not placed within 2-1/2 hours from time of adding water shall be discarded.

PART 3 - EXECUTION

3.01 MIXING MORTAR

B. Mixing: Mortars shall be machine-mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled. The mixing time shall not be less than three minutes or more than five minutes. The water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained. No partially hardened mortar shall be used and no retempering of mortar will be permitted. Use the minimum amount of water consistent with good workability on the mortar board, to provide maximum bond strength within capacity of the mortar.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for Mortar and Grout complete in place, but all costs therefore shall be included in the item of work to which it pertains.

-END OF SECTION-

SECTION 04150

MASONRY ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing of masonry accessories, including wall and joint reinforcement, anchors, ties, and control joint filler, in accordance with Standard Specifications Construction Section 04150, except as modified herein.

PART 2 - PRODUCTS

2.02 CONTINUOUS WALL REINFORCEMENT

A. Provide truss type, welded wire units fabricated from 9 gage ASTM A82 cold-drawn galvanized steel wire with deformed side wires and smooth cross wires, except, at 8 in. thick CMU, provide "Extra-Heavy" units with 3/16" side rods. Space units not more than 16 in. o.c. vertically unless otherwise indicated on Drawings. Provide prefabricated corners and tees. Provide one side rod for each concrete masonry shell face. Provide width as recommended by manufacturer for wall width and which gives at least 5/8" minimum cover on exterior walls.

2.03 BAR REINFORCING

A. Reinforcing Steel: Provide deformed rebars complying with ASTM A615, Grade 60.

B. Galvanizing: Provide hot-dip galvanized, ASTM A153, class B2, 1.5 oz/ft^2 zinc coating on all reinforcing, except items of stainless steel.

2.04 MASONRY ANCHORS

E. Masonry to Structural Steel Anchors: Provide two-piece, flexible stainless steel anchors which permit horizontal and vertical movement, but provide secure lateral restraint. Provide size, gage and strength as necessary to provide a safe installation.

2.05 CAVITY WALL TIES

A. Masonry Ties for anchoring of masonry veneer facing wythes to concrete or CMU back-up shall be a One-Piece Screw consisting of a 92% Zamac 2 Zinc barrel, washer, flanged head and eye to receive a Triangle wire tie; designed to seat barrel directly into masonry or concrete backup, with flanged head covering fastener hole. Provide barrel shaft of length as required to suite condition, and screws to suit conditions, or approved equal as approved by Engineer. Wire tie shall be 3/16 in. diameter, hot-dip galvanized steel, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B-2.

2.09 MISCELLANEOUS ACCESSORIES

A. Bond Breaker: 15 lb. roofing felt complying with ASTM D 226.

B. Control Joint for CMU: Solid rubber strips, Shore A hardness of 60-80 and designed to fit standard control joint concrete masonry units and maintain lateral stability.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work outlined in Section 04200 UNIT MASONRY.

-END OF SECTION-

SECTION O4200

UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies construction of unit masonry, in accordance with Standard Specifications Construction Section 04200, except as modified herein.

1.03 SUBMITTALS

A. Samples: Submit representative samples for each material as follows. Delivered materials shall closely match approved samples.

1. Concrete unit masonry: Submit one full size unit of each type, size, and color.

2. Expansion and control joint material: Submit duplicate samples of material, minimum 6 in. length.

3. Mortar: Submit cured mortar samples of each mortar color selected.

4. Reinforcing anchors and ties: Submit samples of each type, size, thickness, and finish specified.

C. Shop Drawings: Provide large scale shop drawings for fabrication, and installation of steel reinforcing. Provide information on the number of pieces, sizes, grade of steel, accessories and all other information needed for fabrication and placement. Show coordination of reinforcing with all items which are to be embedded into masonry construction.

D. Product Data: Submit product data of materials and systems. Include manufacturer's installation instructions, use limitations, and recommendations for each material used.

1.04 JOBSITE CONDITIONS

C. Hot Weather Protection: Use mortar within 1-1/2 hours after mixing. Discard all mortar over 1-1/2 hours old and all mortar that has stiffened due to hydration (setting).

D. Cold Weather Protection: Strictly comply with recommendations of Brick Institute of America Technical Note No. 1a, Cold Weather Masonry Construction, Construction and Protection Recommendations and the Portland Cement Association.

E. Protection: Cover work at the end of each day and whenever work is not in progress. Extend cover down both sides of walls at least 24 in. and hold securely in place.

F. Loading: Do not apply loads until work has set and cured and is ready to accept loading.

G. Staining: Prevent mortar from staining face of masonry that is to be left exposed. Clean exposed masonry immediately using soft brushes and water only. Protect base of walls from splashed mud and other stains.

H. Protect sills, ledges and projections from mortar droppings.

1.06 TESTS

A. Fire-Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which is identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 by independent agencies acceptable to the Engineer and authorities having jurisdiction.

B. No materials shall be used on work without prior test and written approval of the Authority's Testing Laboratory. Materials shall be submitted to Testing Laboratory at least three weeks in advance of proposed first use in structure for subjection to basic acceptance tests and determination of basic mixtures.

C. At start of field operations, and periodically during course of work, the Authority's Testing Laboratory will test materials and mortar and conduct on-job inspections of measuring, mixing, laying, and curing of mortar and masonry materials, including prism tests, in conformance with ASTM C 952 and ASTM E 447 (Method B), to ensure compliance with these specifications and originally approved samples. Number and frequency of tests shall be determined by the Authority's Testing Laboratory and Engineer. Recommendations of the Authority's Testing Laboratory shall be strictly followed.

D. Prepare seven-day and 28-day prisms for each 5,000 sq. ft. of brick and CMU wall area installed, and deliver to testing laboratory as directed.

1. Height:thickness ratio for CMU prisms shall be no less than 1.33:1 and no more than 3:1.

PART 2 - PRODUCTS

2.03 CONCRETE MASONRY UNITS

B. Provide moisture-controlled units at all locations, of Portland cement, water, sand, and gravel. Provide hollow and/or solid configurations as indicated, and conforming to ASTM C 90. Provide concrete masonry units with following characteristics:

1. Moisture Content: Not more than 35% of total absorption when tested in accordance with ASTM C 140. Maintain moisture content within this limit throughout storage and construction.

2. Residual Linear Shrinkage: Not more than 0.01% when dried to equilibrium of 50% relative humidity at 73°F. ambient temperature.

3. Provide block exposed in finished work with uniform light gray color. Manufacture units in a single run, uninterrupted except at ends of normal working days, to assure uniformity of color and texture. Moderate "manufacturing range" of variation in color and texture will be permitted, but such variations shall not exceed those shown on approved sample panels.

4. Size: Provide units 8 in. by 16 in. nominal face size, and of indicated nominal thicknesses, unless otherwise indicated.

5. Provide special shapes, including bullnose units, end units, of each type of block as required to complete work as indicated at no additional cost to Owner. Carefully review Drawings to determine scope and varieties of special block shapes required. Provide lip stretcher block 100% solid.

6. Concrete Masonry Units for Fire-Resistive Construction: Provide light-weight concrete block for construction of fire-rated masonry block construction as listed by Underwriters' Laboratories, Inc. of Minimum Equivalent Thickness(es) defined and required by governing code.

   a. Concrete masonry units to be used in the construction of 2-hour, 3-hour, and 4-hour rated walls shall be clearly stamped with the appropriate 2-hour, 3-hour, or 4-hour designation by the manufacturer.

7. Faces of units exposed in finished work shall be handled and stored with extreme care to prevent chipping or marring. Chipped or otherwise damaged faces will not be permitted in exposed work.

8. Provide half-blocks, lintel blocks, beam "U" blocks, other special blocks, and required special cutting. Provide jamb blocks, end blocks, control joint blocks, and lintel blocks with exposed ends closed.

C. Polished Concrete Masonry Unit Work: Polished concrete masonry unit shall have 2% or less silica in the aggregate. Aggregate for polished face CMU shall be high-grade dolomite limestone conforming to ASTM C 33, in colors selected by Engineer. Two colors will be required. Cement colors shall be achieved with a mix of color aggregates from the E. Dillon and Company Premier Line, or approved equal. Provide polished concrete masonry units, from one of the following manufacturers:

1. Premier Line, as manufactured by E. Dillon & Company; Swords Creek, VA.
2. Westbrook Concrete Block; Westbrook, CT.
3. Clayton Block; Lakewood, NJ

PART 3 - EXECUTION

3.02 GENERAL CONSTRUCTION REQUIREMENTS

K. Control Joints in Concrete Masonry Unit Work: Provide vertical building expansion joints in walls, continuous through both wythes at locations indicated. Construct expansion joints in CMU by use of closed-end type block with cast-in reglet to form a continuous, full-height open joint approximately 3/8 in. wide. Omit mortar from joint and insert continuous "X" type neoprene joint filler in reglets to serve as waterstops. Keep joint open, ready to receive joint backing and sealant by sealant trade

1. Provide vertical control joints in field of interior concrete masonry unit work, including inner wythes of exterior walls, as indicated. Do not exceed 30 ft. apart. Unless otherwise indicated, construct control joint with closed-end type block to form a continuous, full-height open joint approximately 3/8 in. wide. Omit mortar from joint and substitute compressible semi-rigid fiberglass joint filler to

within 3/4 in. of each face, ready to receive joint backing and sealant by sealant trade.

2. Provide control joints at ends of interior concrete masonry unit walls at steel columns. Longitudinal reinforcing "Tees" (concrete unit masonry-to-concrete unit masonry) and masonry anchors (masonry-to-steel columns) at these joints shall be as specified in this Section. Fill masonry-to-masonry joints solidly with mortar and rake out 3/4 in. deep, ready to receive joint backing and sealant. Install compressible joint filler at masonry-to-steel column joints, held back 3/4 in. on each face to receive joint backing and sealant.

3. Provide control joints at top of each interior non-bearing wall and partition and ceiling or framing member above, as indicated. Control joints shall be indicated thicknesses, generally 1-1/2 in. at steel framing members and 1 in. at steel deck.

L. Provide chases, slots, and recesses as required to accommodate work of other trades. Close only after such work has been installed, tested, and approved. As work progresses, set anchors, bolts, frames, and work of other Sections required to be built into masonry. No cutting and patching of completed masonry work will be permitted except as approved by Engineer.

M. Grout steel frames solidly into masonry openings. Grout under continuous blockings bearing on masonry walls to provide uniform continuous bearing. Grout elevator thresholds solidly and to proper levels.

N. Maintain masonry clean as work progresses. Exercise extreme care at exposed work to prevent smearing or staining with mortar.

O. At completion of work cut out and rejoint holes and defective joints, leaving entire work free of blemishes.

P. Cooperate and coordinate work of this Section with Waterproofing trades. Coordinate work of this Section with installation of flashings by other trades.

Q. Discard all broken, chipped, cracked, stained, or otherwise damaged masonry units.

R. Tolerances: The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Documents. Do not add these tolerances to any allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb: $\pm$ 1/4 in. in 20 ft.-0 in..
2. Allowable Variation from True Line: $\pm$ 1/4 in. in 20 ft.-0 in.

3.03 REINFORCEMENT AND MASONRY ACCESSORIES

E. Reinforce unit masonry work as indicated on Drawings,

3.04 MORTAR BEDS

E. Concrete Masonry Units: Lay Concrete Masonry Units with full mortar coverage on horizontal and vertical face shells.

1. Provide full mortar coverage on horizontal and vertical face shells and webs in all courses of following:

   a. Piers, columns and pilasters;
   b. Starting courses on footings and solid foundation walls;
   c. Where adjacent to cells or cavities to be filled with grout.

2. For solid units, lay with full mortar coverage on horizontal and vertical joints.

3.06 POINTING AND CLEANING

C. Soon after masonry work is completed, lightly stone down exposed surfaces of concrete masonry units to remove excess mortar and aggregate projections. Vacuum clean interior work with brush type head attachment to remove loose granules and building dust from pores of units prior to subsequent finishing operations.

D. Upon completion, thoroughly clean exposed exterior masonry with a solution of detergent and water, using stiff fiber or stainless steel brushes. Cleaners or other solutions which may cause discoloration or damage will not be permitted. Muriatic acid is not permitted.

1. Prior to applying any cleaning materials on finished masonry work, provide a test cleaning mock-up on masonry mock-ups at locations acceptable to the Engineer.

2. Test cleaning techniques and solutions to determine the best methods for the conditions encountered. Demonstrate Contractor's quality control system to ensure uniform final appearance. Test adjacent non-masonry surfaces for possible adverse reactions to cleaning methods. Use all cleaning products in strict compliance with the manufacturers' instructions and recommendations. Keep accurate, detailed records of concentrations, solutions, and techniques used to assist in replicating satisfactory results.

D. Rake out imperfect mortar joints of masonry work and repoint to match appearance of surrounding acceptable work. Leave entire work free of defects.

3.07 MASONRY CONSTRUCTION GENERAL

A. All masonry shall be laid by skilled workmen under adequate supervision, and shall be laid true to lines and levels, with joints of uniform thickness, all surfaces true, corners straight and plumb, and within specified tolerances.

B. Cut masonry units with a motor-driven saw designed to cut masonry, with clean, sharp, unchipped edges. Use full units without cutting wherever possible.

3.08 FLASHING INSTALLATION AND COORDINATION

A. Flashings are specified in Section 07600 - Flashing and Sheet Metal; coordinate the installation with the masonry work.

B. Prepare masonry surfaces to receive flashings smooth and free of projections.

C. Provide for flashing at every obstruction to the downward flow of water.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. No separate measurement and payment will be made for the Base Bid masonry work of this Section complete in place, but all costs in connection therewith shall be included in the Contract Lump Sum Price for Masonry.

B. No separate measurement and payment will be made for the masonry work required to complete Alternate No. 3, complete in place, but all costs in connection therewith shall be included in the Contract Lump Sum Price for Alt. 3-Add Elevator at South Headhouse.

ITEM NO.	DESCRIPTION	UNIT
0420.100	Masonry	Lump Sum

-END OF SECTION-

SECTION 04450

STONE WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the following:

1. Exterior and interior stone veneer work;
2. Interior and exterior stone paving work, including stair treads, pavers;
3. Complete stainless steel anchors and support system;
4. Grout, and related components needed to complete the work;
5. Stainless steel flashing and plastic weep system at exterior stone.
6. Engineering, sizes, and spacings of anchors.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:

1. Section 04200, UNIT MASONRY.
2. Section 07920 - SEALANTS AND CAULKINGS; materials and requirements.
2. Section 09861 - GRAFFITI CONTROL.

1.03 SUBMITTALS

A. Samples: Submit representative samples of product to be furnished under this Section to Engineer for selection and approval, as follows. Delivered materials shall closely match the approved samples.

1. Stone: Sufficient 12 in. by 12 in. samples to show the full range of color, texture, and finish of each type of stone proposed for use.

2. Stone Accessories: Duplicate samples of cramps, anchors, dowels, and other accessories as may be requested by Engineer.

B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following items:

Expansion joint filler
Grout materials, including additives
Mortar coloring additive
Mortar materials, including additives

C. Shop Drawings: Cutting and setting drawings of stone pieces specified herein shall be submitted. Drawings shall indicate anchorage system, including steel support angles, anchors, cramps, dowels, etc., complete stone sizes, dimensions, layout, finishes, arrangement and other necessary details for reception of other work.

1. Drawings shall indicate locations of inserts for stone anchors and supports which are to be built into concrete and masonry, and locations and dimensions of cut-outs, holes, openings, and other provisions required for the work of other trades.

2. Shop drawings shall indicate the setting number of each piece and each piece shall bear the corresponding number in a non-staining paint. Note that shop drawings may be required to be submitted in two separate packages in order to expedite phasing of the work.

D. Contractor's Review: Before commencing work, submit written statement signed by the Contractor stating that the Contract Documents have been reviewed with a qualified representative of the stone supplier, and that he is in agreement that the selected materials and construction are proper, compatible with adjacent materials, and adequate for the application shown.

1.04 SAMPLE INSTALLATION

A. Install on the building in specific location directed by Engineer at least one sample stone installation conforming to typical project construction. Sample installation shall be approximately 20 sq. ft. in area, located as directed by Engineer, and shall show the proposed stone type, color, and finish, anchorage system, joint sealing (by other trade), flashings (by other trade), weepholes, and other pertinent details of installation.

B. Replace sample installation as many times as necessary until Engineer's approval of the installation has been obtained. Upon Engineer's approval, construct all subsequent stone work to conform to approved sample installation.

C. Approved sample installation may be incorporated into the completed work.

1.05 COORDINATION

A. The work of this Section shall be coordinated with that of other trades affecting, or affected by, this work, as necessary to assure the steady progress of the work under the Contract.

B. Do all cutting and drilling to accommodate the work of others as may be reasonably implied from the Drawings and Specifications, or required for the proper completion of the Work.

C. Setting shall take account of the probable order of Construction.

1.06 DELIVERY, HANDLING, AND STORAGE

A. Stone shall be carefully packed and banded by the supplier for shipment. Following shipping stone shall be stored on wood skids or pallets, covered with non-staining, waterproof membrane and protected from the weather. Skids shall be placed and stacked in such a manner as to evenly distribute the weight of the stone materials and to prevent breakage, cracking, and damage to stone pieces. Stone materials shall be

stored in such a manner as to allow air to circulate around the stone material. Stone shall not be permitted to be in direct contact with the ground any time during storage.

B. Stone shall be carefully handled to prevent chipping, breakage, soiling, or other damage. Pinch or wrecking bars shall not be used without protecting edges of stone with wood or other rigid materials. Stone units shall be lifted with wide-belt type slings wherever possible; wire rope or ropes containing tar or other substances which might cause staining or damage to stone finish shall not be used.

C. Stone damaged in any manner will be rejected and shall be replaced with new materials at no additional cost to the Owner.

D. Store setting materials on raised platforms or slabs, under watertight covers or indoors. Protect metal angles, anchors, cramps, dowels, etc. from the elements. Immediately before placing remove all loose dirt, and other foreign materials.

1.07 PROTECTION OF FINISHED SURFACES

A. Finished surfaces adjacent to the stone work shall be adequately protected from soiling, staining, and other damage.

1.08 QUALITY ASSURANCE

A. Stone shall be supplied by a source approved by the Engineer.

B. Granite shall conform to the requirements of ASTM C 615, Architectural Grade and NBGA Specifications, except as modified herein.

C. Stone shall be standard grade, free of cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance. Color, texture, and finish shall be within the range of samples approved by the Engineer.

1.09 PROJECT CONDITIONS

A. Protection of Stone Veneer Assemblies: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone veneer assemblies when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone veneer assemblies.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone veneer assemblies.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace stone veneer assemblies damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in **ACI 530.1/ASCE 6/TMS 602**

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 GRANITE

A. Match Engineer's samples for variety, color range, finish, and other stone characteristics relating to aesthetic effects.

B. Granite Building Stone Standard: ASTM C 615.

C. Granite shall be of the sizes and dimensions indicated on the Drawings.

D. Acceptable colors of granite are specified below; other sources will be reviewed according to substitution requirements specified in the Conditions of the Contract.

1. Granite for Headhouse Piers: Equal in color to Deer Isle Granite.
2. Granite for Pavers and Stair Treads: Medium to dark grey color, similar to stair color at Aquarium Station.

E. Exposed surfaces of granite shall have a thermal finish; all other surfaces shall be saw cut.

F. Flatness Tolerances: Variation from true plane, on flat surfaces, shall be determined by use of a 4 ft. long straightedge applied in any direction on the surface. Such variations at the bed and joint arise lines shall not exceed 3/64 in. or 1/6 of the specified joint width, whichever is greater. Variations from true plane on other parts of the face surfaces shall not exceed 3/64 in.

G. Beds and Joints: Pieces shall be bedded and jointed as shown on the approved shop drawings, and bed joint and vertical joint surfaces shall be cut with 3/16 in. beds and joints, as indicated on the approved shop drawings, sawn or cut full square back from the face at least two-thirds of the piece thickness. From that point the bed may fall under square not more than 1 in.

H. Back of granite which will be concealed in the finished work shall be sawn to approximately true planes. Maximum variation in thickness shall be 3/16 in. Sawn backs shall be cleaned of rust stains and iron particles.

I. All faces, shall be at right angles to the plane of the top.

J. Granite shall be accurately cut to required shape and dimensions.

K. Holes, cut-outs, sinkages and openings in granite work for anchors, cramps, dowels, supports, and lifting devices, shall be accurately cut or drilled to required dimensions, as shown on the approved shop drawings, and as necessary to secure granite in place to insure correct location and accurate fit of all fixtures. Setting beds shall be shaped to fit supports.

L. Arises shall be cut sharp and true to square, and continuous with adjoining arises. Where exposed, arises shall be eased.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: **ASTM C 207**, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.

D. For pigmented mortar, use a colored cement formulation as required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations.

1. Pigments shall be composed of natural or synthetic iron oxides, compounded for use in mortar mixes, and with a record of satisfactory performance in stone masonry mortars.
2. Pigments shall not exceed 10 percent of portland cement by weight.

E. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

a. Match Engineer's sample.

F. Latex additive (water emulsion) described below, serving as replacement for part of or all gaging water, of type specifically recommended by latex-additive manufacturer for use with job-mixed portland cement mortar and not containing a retarder.

1. Latex Additive: **Styrene-butadiene rubber or acrylic resin.**

G. Water: Potable.

H. Products: Provide one of the following or equal approved by Engineer:

1. Colored Portland Cement-Lime Mix:

a. Blue Circle Cement; Eaglebond.
b. Glen-Gery Corporation; Color Mortar Blend.
c. Holnam, Inc.; Rainbow Mortamix Custom Color Cement/Lime.
d. Lafarge Corporation; Centurion Colorbond PL.
e. Lehigh Portland Cement Co.; Lehigh Custom Color Portland/Lime.
f. Riverton Corporation (The); Riverton Portland Cement Lime Custom Color.

2. Mortar Pigments:

a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
b. Davis Colors; True Tone Mortar Colors.
c. Lafarge Corporation; Centurion Pigments.
d. Solomon Colors; SGS Mortar Colors.

3. Latex-Additive:

a. Boiardi Products Corporation;
b. MAPEI Corporation;
c. Southern Grouts & Mortars, Inc.;
d. TEC Specialty Products Inc.

2.03 STONE SUPPORT SYSTEM, MATERIALS AND PRODUCTS

A. Stainless Steel Shapes: AISI Type 304.

B. Stainless Steel Slotted Channels: Provide 12 gage 1-5/8 in. slotted stainless steel channels, fabricated from AISI 304 stainless steel.

1. Provide bolts and channel nuts with springs.

C. Fasteners: For fastening stainless steel slotted channels to structural steel, provide 1/4-20 #4 pt. Dril-Flex fasteners or AISI Stainless Steel self-tapping screws, 0.242 in diameter (14), 10 threads per inch, 1 in. in length, with a hex head.

D. Bolts and Fasteners: Stainless steel and other types as appropriate and approved by Engineer.

E. Stainless Steel angle support anchors for general use shall consist of continuous lengths of steel angles, indicated sizes, pre-drilled for anchor bolts, all as shown on the approved shop drawings.

F. Anchors, cramps, dowels, shims, and other metal items required for the support and anchorage of the stone work shall be stainless steel and shall be furnished under this Section.

G Anchors, cramps, dowels, and other items to be set into concrete or masonry shall be stainless steel and shall be furnished under this Section for installation under the concrete section or masonry section, as applicable. All other metal items shall be

installed under this Section.

H. Anchors, cramps, dowels, shims, and other metal items, shall be AISI Type 304 stainless steel.

I. Galvanized tube steel for the support and anchorage of the stone work shall be engineered, furnished and installed under this Section, and shall be as follows:

1. Steel Plates, Shapes, and Bars: ASTM A 36.
2. Steel Tubing: ASTM A 500 or A 501, hot or cold rolled, as required for design loading.
3. Welding rods: Conform to AWS Standards and recommendations of welding rod manufacturer.
4. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.
5. Fabricate miscellaneous galvanized tube supports with base plates, supports, brackets, braces and the like required to fully complete the work.
6. Design and engineer support systems to carry loads of all items being supported with a safety factor of at least 4 unless otherwise indicated.
7. Allow for thermal movement resulting from 100°F change in ambient temperature.
8. Weld seams continuously. Spot welding is permitted for temporary welding only.
9. Galvanizing: Hot-dip galvanize all steel tube and base plate assemblies, and other steel support items, in compliance with ASTM A 123, ASTM A 153, or ASTM A 386. Provide minimum 1.5 oz./ft.^{2} zinc coating. Galvanize after fabrication.
10. Verify dimensions in field before fabrication.

PART 3 - EXECUTION

3.01 PLACEMENT OF STAINLESS STEEL SUPPORT ANCHORS

A. Stone shall be anchored and doweled as indicated, and as shown on the approved shop and setting drawings.

B. The stainless steel support angles shall be leveled and shimmed to provide level seating and plumb plane for the facing , and shall be securely welded or bolted to the back-up construction, in accordance with AISC Specifications.

3.02 SETTING GRANITE WALL VENEERS AND CAPS

A. Setting shall be done by competent stone setters under adequate supervision and in accordance with the approved shop and setting drawings.

B. Stone units with chips, cracks, stains, or other defects which might be visible in the finished work shall not be used.

C. Before setting, stone shall be clean and free of dirt, and foreign matter on all sides thoroughly scrubbed with mild cleaner and rinsed with fresh clean water. Stone shall be dry before setting.

D. Stone pieces shall be supported by stainless steel channels and galvanized tube steel supports, as indicated, or as otherwise required by fabricator and/or Installer. Each piece shall be anchored to supports and slotted channels with appropriate types of

anchors, cramps, dowels, etc., as specified elsewhere herein. Particular care shall be exercised to equalize bed and joint openings and eliminate the need for redressing of exposed surfaces. Exposed surfaces shall be kept free of mortar at all times.

E. Install stone plumb; true to line; with level courses; straight, clean, uniformly wide joints; true surfaces; and straight plumb corners. Maintain horizontal and vertical alignment of joints.

F. Install anchors, cramps, dowels, etc., as the stone facing work progresses. Securely anchor to back-up construction as indicated on the approved shop and setting drawings. Set anchors, cramps, dowels, etc., in anchor holes drilled into the stone edges and backs, after filling the holes with fresh mortar. Clean off excess mortar after setting, while still fresh. Mix mortar in small batches to assure continuing freshness.

G. Do not use installed stone work to support or in any way receive scaffolding or other temporary supports.

H. Provide complete protection against breakage, staining, and weather damage during and after installation of the stone work by use of suitable, strong, impervious film or fabric securely held in place. Tops of stone shall be positively protected with non-staining waterproof coverings, properly weighted, at night, during showers, and whenever stone setters are not working on the walls.

I. Maintain stone work clean as the work progresses. Exercise extreme care at exposed work to prevent smearing or staining with mortar. Wash mortar stains immediately from exposed surfaces.

J. Pointing: After stone has set, point joints with specified pointing grout. When grout is thumbprint hard, tool joints to a concave profile.

3.03 PREPARATION OF FLOORING AND STAIR TREAD SUBSTRATES

A. Initial Preparation: Surfaces to receive stone flooring materials shall be level, plumb, true to line and plane, clean, and free of loose dirt and dust, grease, oil, paint, and other deleterious materials, ready to receive work of this Section.

B. Final Preparation:

1. Thoroughly examine all surfaces and notify the Engineer, in writing of all conditions which would adversely affect installation or performance of this work. Do not commence work in any area where such notice of adverse conditions has been filed, until corrective work has been completed or waived. Starting of work in any area without issuance of such notice shall constitute acceptance of conditions as being satisfactory to properly receive the stone flooring work.

2. Do final cleaning of surfaces just prior to installation of stone flooring materials, removing all dust, dirt, and other loose particles.

3.04 JOB CONDITIONS FOR FLOORING AND STAIR TREAD INSTALLATION

A. Ambient temperature at stone flooring installation shall be not less than 40° F. for at least 48 hours prior to commencement of stone flooring work, during the stone flooring work, and for at least 48 hours after completion of installation of the stone flooring work.

3.05 FLOORING AND STAIR TREAD INSTALLATION

A. Stone flooring and stair tread work shall be done in strict accordance with the approved shop and setting drawings by skilled and fully competent workmen, fully instructed as to the requirements of this specification, and adequately supervised during the work.

B. Before being set, all stone shall be clean and free of ice, frost, and other deleterious materials, and shall be thoroughly scrubbed with mild cleaner and rinsed with fresh, clean water.

C. Install stone flooring over concrete slabs by use of Portland cement mortar setting beds applied directly to slab. Moisten concrete surfaces prior to installation of setting beds, but do not leave free water on the surfaces.

1. Install stone stair treads in epoxy mortar, as indicated on Drawings.

D. Install setting beds for flooring between 3/4 in. and 1-1/4 in. thick at floor slabs, as required to obtain proper finish lines and planes indicated. Dust on a thin layer of dry Portland cement over the surface and work into the freshly laid mortar setting bed. Lay stone in patterns and layouts indicated on the approved shop drawings, in individual pieces, tamping to level with wood block or rubber hammer. Remove each piece and apply thin coat of neat Portland cement paste to bottom side, and then re-set. Do not fill joints at time of laying.

1. Install stone stair treads on thin epoxy bed, 1/2 in., or as indicated.

E. Maintain approximately 3/8 in. uniformly wide joints between all adjoining stone pieces, except, lay slate flooring stones with hand-tight joints.

F. Use true wood straightedge and mason's level as guides to establish and maintain levels. Start work at one corner of a room or area and work away from it to prevent kneeling on wet stone already set.

G. Except for expansion and control joints, all joints left open or previously raked shall be brushed clean and fully filled and pointed with grout to a flat cut joint. Grouting shall not commence until at least 24 hours after placing the stone work. When grout is thumbprint hard, the joints and bed shall be tooled with a round jointer having a diameter approximately twice as large as the width of the joint.

1. Do not grout joints in slate flooring pavers. Joints shall be left hand-tight.

H. Provide control joints (1) around full perimeter of each area of stone flooring where abutting surrounding material, (2) where stone flooring abuts projections through the flooring such as columns and pipes, (3) directly over expansion joints in concrete subsurfaces, and (4) not farther than 24 ft. each way in the field of the work, located as indicated on the approved shop drawings or as directed by Engineer.

1. Install stone to provide sharp edge control joints, and form the control joints to uniform 3/8 in. width, except full width over building expansion joints, and take to full thickness of stone and setting bed combined.

2. Fill the control joint spaces with removable, nonstaining temporary filler, to be removed at time of sealing by the joint sealant trade under the work of Section 07920, SEALANTS AND CAULKINGS.

I. Maintain stone work clean as the work progresses. Exercise extreme care at exposed work to prevent smearing or staining with mortar or grout. Wash mortar and grout stains immediately from exposed surfaces.

J. Tear out and replace with acceptable work all work not conforming to the Specification requirements.

3.06 CLEANING

A. After stone work has been carefully cleaned, removing all dirt, excess mortar, stains, and other defacements.

1. Mild abrasive cleaners that contain no harsh or caustic ingredients may be used, with fiber brooms or brushes and clear water. Wire brushes, steel wool, and acids or other solutions which may cause discoloration are expressly prohibited.

2. Expansion joints and other joints to receive sealant shall be cleaned of all mortar and left ready for sealing of joints under Section 07920, SEALANTS AND CAULKING.

B. Upon completion of stone work, surfaces shall be left in a clean, unsoiled condition, acceptable to the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0440.000	Stone	Lump Sum

-END OF SECTION-

SECTION 05041

HOT-DIP GALVANIZING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies Hot-Dip Galvanizing for all miscellaneous steel, architecturally exposed steel, and structural steel that is exposed to view, the weather, moisture, or corrosive atmosphere. Such items shall include but are not limited to:

1. Structural steel items specified in Section 05100, STRUCTURAL STEEL.
2. All steel items specified in Section 05500, MISCELLANEOUS METALS.

B. Galvanized Concrete Reinforcement; See Section 03200

C. Definition of Hot-Dip Galvanizing: The dipping of steel members and assemblies into an alloy of molten zinc and nickel for lasting long-term protection. The resultant nickel zinc alloys with the base metal.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:

1. Section 05100 - Structural Steel
2. Section 05500 - Miscellaneous Metal

1.03 QUALITY ASSURANCE

A. Reference Standard:

1. American Hot-Dip Galvanizers Association, Inc., (AHDGA):

   Publication entitled "Inspection Manual for Hot-Dip Galvanized Products.

2. American Society for Testing and Materials (ASTM):

   A 123 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware

   A 143 - Safeguarding Against Embrittlement

   A 384 - Safeguarding Against Warpage

   A 385 - Providing High Quality Zinc Coatings

1.03 SUBMITTALS

A. Certification: Furnish Notarized Certificates of Compliance with ASTM Standards and Specifications herein listed. Each Certificate to be signed by the Galvanizer and shall list a detailed description of all material. Certification shall state that the galvanizing is in full conformance with these specifications.

B. Visual Stamp: Mark all lots of material with a clearly visible tag indicating the name of the galvanizer, the weight of the nickel - the coating and the applicable ASTM Specification numbers.

C. Product Data: Submit product literature and sample for organic zinc rich repair compounds to be used.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaging: Of a suitable type to prevent damage to the finished surface and to prevent shipping damage to the material.

B. Handling and Storage: Handle and Store in such a manner as to minimize damage to the finished material.

PART 2 - PRODUCTS

2.01 STEEL MATERIALS

A. Material for galvanizing shall be geometrically suitable for galvanizing as specified in ASTM A-384 and A-385.

B. To be chemically suitable for galvanizing, steel shall contain carbon below 0.25%; phosphorous below 0.05%; manganese below 1.35%.

2.02 NICKEL-ZINC FOR GALVANIZING

A. Conform with ASTM B-6, as specified in ASTM A123 only with the addition to the bath of a predetermined amount of nickel (not less than 0.05% by weight) to counter the affect of high silicon steel.

2.03 GALVANIZING

A. Steel members, fabrications, and assemblies as identified in Section 1.01A shall be galvanized after fabrication in accordance with ASTM A 123.

B. Safeguard against embrittlement in conformance with ASTM A143.

C. To safeguard against warpage or distortion of steel members, in conformance with ASTM A384, submit shop drawings of non-standard fabrications, all tubular fabrications, all fabrications involving materials of different thicknesses. Submit drawings to the galvanizer prior to fabrication to determine the suitability of the material for galvanizing. To prevent unnecessary damage to the finished coating by

field welding the method of connection shall be bolted wherever possible. To insure a smooth even coating pipe rails shall be fabricated from mechanical steel tubing with "slip fit" type connections.

1. Note on shop drawings locations of "blow holes" so that they can be drilled prior to galvanizing.

D. Weight of Coating: Weight of all zinc coating shall be 2.0 ounces per sq. ft. minimum.

E. Galvanizing Application: Galvanize materials in accordance with specified standards and this Specification. Galvanizing shall provide an acceptable substrate for applied coatings. After pickling and prior to galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The dry kettle process shall be used to eliminate any flux inclusions on the surface of the galvanized material.

F. Galvanizing shall be performed under conditions so that "White Rust" is avoided.

G. Fabricator shall "dry-erect" canopies, stairs, bridge, and bench windscreens prior to galvanizing, to ensure proper fit.

PART 3 - EXECUTION

3.01 INSTALLATION OF STEEL MATERIALS

A. Steel materials, fabrications, and assemblies are specified to be installed in various other sections under Division 05, METALS.

3.02 TOUCH-UP AND REPAIR

A. Repair damaged and field welded galvanized surface in accordance with ASTM A780.

B. Dry film thickness of the organic zinc rich repair compound shall not be less than 6 mils.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for all work required under this Section, but all costs in connection therefore will be considered incidental to the item of work to which it pertains.

END OF SECTION

SECTION 05100

STRUCTURAL STEEL

PART 1 – GENERAL

Under PART 1 – GENERAL; delete Subsection 1.01 in its entirety and substitute the following:

1.01 DESCRIPTION

A. This Section specifies structural steel construction in accordance with Standard Specifications Section 05100, except as modified herein.

B. The following sections contain requirements that relate to this Section:

1. Section 03604 - Non-Shrink Construction Grout
2. Section 09900 – Painting; shop Primers and field coats.
3. Section 09841 – Sprayed Fireproofing

C. Work of this Section also includes requirements regarding the appearance and the surface preparation of Architecturally Exposed Structural Steel (AESS). This applies to any member noted on the Architectural or Structural Drawings as AESS.

1.02 QUALITY CONTROL

Under Subsection 1.02 delete Paragraph "A" in its entirety and substitute the following:

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."

   a. Paragraph 4.2.1. of the above code is hereby modified by deletion of the following sentence:

      1) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these drawings."

2. AISC "Specifications for Structural Steel Buildings," including "Commentary."

3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.

4. Welded fabrication of structures designed in accordance with AASHTO (the lobby roof under the street) and AREMA shall be fabricated in accordance with the Bridge Welding Code, ANSI/ AASHTO/ AWS D1.5 including all interim revisions published by AASHTO as of the opening bid date.

5. Welded fabrication for all other structures shall be in accordance with the Structural Welding Code, AWS D1.1-96.

6. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

Under Subsection 1.02C., add Subparagraph 3 as follows:

3. Allowable deviations from detailed length:

For members with ends milled for bearing and members with end connections angle faces	±1/32 in.
For framed members not milled or faced:	
Lengths of 30 feet and under	±1/16 in.
Lengths over 30 feet	±1/8 in.
For all other members	±1/4 in.

Delete Subsection 1.02E in its entirety and add the following:

E. Welding Qualifications

1. Welding procedures, welders, welding operators and tackers shall be qualified in accordance with AWS D1.1. and D1.5 as required.

2. For structural steel requiring impact test qualification (see paragraphs 2.01.B and 2.02.E herein) and for corrosion- resistant structural steel, the weldability if the steel and the procedures for welding it shall be established, by qualification in accordance with AWS D1.5 to match the notch toughness and weathering characteristics of the base metal.

3. Welds shall be made only by welders, welding operators and tack welders who have been previously qualified by tests as prescribed by AWS D1.5 and AWS D1.1 to perform the type of work required. Certification shall be provided by the fabricator for each welder, welding operator and tack welder involved that has been thus qualified within the previous 12 months.

4. The AWS D1.5 shall be used for all requirements not specially cover herein.

Under Subsection 1.02F; delete Subparagraph "1 and 5" in their entirety and substitute the following; add Subparagraph 12 and 13 as follows:

F. Tests and Inspection

1. The Engineer will test and inspect high-strength bolted connections and prepare test reports except for specialty tests. Specialty tests shall be performed at no expense to the Authority by an independent testing laboratory approved by the Engineer. The independent testing laboratory shall maintain inspectors for this work who possess certification as Certified Welding Inspectors in accordance with the provisions of AWS QC1 "Standard and Guide for Qualification and Certification of Welding Inspectors." Notify the Engineer not less than 48 hours prior to conducting specialty tests. Costs of specialty tests shall be borne by the Contractor. Test reports shall be submitted to the Engineer for approval.

5. Specialty Tests. All nondestructive testing shall be made by the contractor in accordance with the procedures and standards set forth in the governing welding code. All welding must meet acceptable quality standards which are defined by the acceptance criteria for the particular test method of the governing welding code.

   a. Nondestructive testing of welds for steel fabricated in accordance with the provisions of AWS D1.1 shall be made in accordance with the following schedule:

      i. All welds will receive visual inspection per Chapter 6 of the AWS D1.1.
      ii. Each complete penetration groove weld in joints and splices shall be tested for the full length
      iii. All partial penetration column splice weld shall be tested by ultrasonic testing or other approved methods.
      iv. Base metal in excess of 1.5" subject to through-thickness weld shrinkage strain shall be ultrasonically tested for discontinuities behind and adjacent to the weld.
      v. 10% of all fillet welds will require magnetic particle testing in accordance with ASTM 109.
      vi. All test results will be documented and forwarded to the Structural Engineer of Record for review.

   b. Nondestructive testing of welds for steel fabricated in accordance with the provisions of AWS D1.5 shall be made in accordance with Section 6.7 of AWS D1.5. All test results will be documented and forwarded to the Structural Engineer of Record for review.

12. Compliance to the requirements of this specification is the responsibility of the Contractor. The Contractor shall institute and maintain a program of testing and inspection to assure complete compliance with all specification requirements.

13. Site Welding:

    Inspect and test during erection of structural steel as follows:

    a. Inspection of all field welding shall be performed by an AWS CWI. CWI shall be present at the start of each day's welding to perform in process inspection of welding activities. CWI shall also perform final inspection on 100% of completed welds.

    b. Field in process and final welding inspection reports shall be provided to the Engineer. All inspected areas by the CWI shall be clearly identified with a paint marker (any color but yellow).

Under Section 1.02, add Subsections G through K as follows:

G. Fabrication, Inspection, and Erection

1. The fabricator's facility shall be inspected and approved before commencement of fabrication. Notify the Authority's Testing Laboratory in writing at least two weeks prior to the scheduled start of the fabrication. All fabrication work shall be conducted by the approved fabricator at the approved facility.

2. Quality Control Inspections

a. Quality Control inspection and testing is the responsibility of the fabricator and shall be performed by sufficient number of qualified inspector to guarantee product integrity. Quality control inspection shall be performed throughout the entire fabrication process from receiving material to shipping materials, especially during and after welding. The fabricator shall maintain adequate inspection records. Such records will be provided to the Engineer upon request.

b. Quality control inspectors at the fabricating shop shall be certified by the American Welding Society in accordance with the provision of the Standard for Qualification and Certification of Welding Inspectors (AWS QCI). The Engineer, upon written request from the fabricator, may accept other certifications or experience and training consistent with AWS QC1. Assistant inspectors may be used to perform specific inspection under the direct supervision of a Quality Control Inspector.

c. Material fabricated that does not meet the plans and specifications will not be incorporated into the work. Repair procedures, other than those allowed under the Bridge Welding Code, shall be submitted to the Engineer for approval.

3. The Primary Fabricator for work specified under this section shall have been engaged in satisfactory manufacturer of structural steel of the same magnitude as specified herein. Furthermore, its production shall conform to the standards of control outlined in the American Institute of Steel Construction Specifications and it shall be certified by the AISC Certification Program for conventional steel building structures (SBD) except for the bridge requirements stated below.

4. Structural steel fabricators of lobby roof under the street shall be certified under the AISC Quality Certification Program for Major Steel Bridges (CBR). The workmanship and finish shall be equal to the best general practice in modern bridge and building shops.

5. If any work is to be sub-contracted, the Fabricator for such work must meet all requirements for quality control and satisfactory engagement in manufacturer of structural steel specified for its portion of the work.

6. The Erector shall have been engaged in satisfactory erection of structural steel of the same magnitude and complexity as that covered by this section, and shall be certified under the AISC quality certification program as an Advanced Certified Steel Erector.

H. Detailing of Connections

1. Connections will normally be detailed on the Contract Drawings. If the Contractor is required to detail any structural steel connections they shall be done in accordance with the AISC "Manual of Steel Construction - Allowable Stress Design" Part 4, Connections; AISC "Simple Shear Connection" Design Aid; and "AISC Manual, Volume II, Connections." A certified Independent Testing Agency shall perform an inspection of the steel frame to verify compliance with the details.

2. All connection designed and detailed by the contractor shall have calculation and shop drawings stamped by a licensed professional Engineer in the Commonwealth of Massachusetts submitted for review and approval by the Engineer.

I. Fabricator Qualifications for AESS: Engage a firm experienced in the fabrication of AESS similar to that indicated on this Project, with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.

J. Erector Qualifications for AESS: Engage a firm experienced in the erection of AESS similar in material, design, and extent to that indicated for this Project, and with a record of successful in-service performance.

K. Comply with applicable provisions of the following specification and documents:

1. AISC "Code of Standard Practice", latest edition, Section 10 as amended herein:

Mock-Ups: At least 4 weeks prior to fabricating AESS, construct mock-up of one complete bay, to demonstrate the aesthetic effects as well as the qualities of materials and executions. The mock-up shall demonstrate weld quality, contouring of welds at the aligned walls of members. Build mock-up to comply with the following requirements, using materials indicated for final unit of work:

a. Locate mock-up on site or in fabricator's shop as directed by Engineer. Mock-up shall be full size components;
b. Notify Engineer 7 days in advance of dates and times when mock-up will be available for review;
c. Obtain Engineer's approval of mock-up prior to starting fabrication of final units;
d. Maintain mock-up in undisturbed condition as a standard for judging the completed work.
e. Mock-up may be incorporated into the completed work.

1.03 SUBMITTALS

Under Subsection 1.03A; add Subparagraph "4 and 5" as follows:

4. Methods of Erection: Prior to starting work the Contractor shall submit to the Engineer a description of the methods, sequence of erection, and type of equipment he proposes to use for erecting the structural steel work. The submitted method of erection is subject to review, comment and approval by the Engineer. The method must be submitted with a detailed procedure which includes drawings and calculations sufficient to enable the engineer to determine the adequacy of the proposed method. The method and all submissions shall be prepared under the supervision of a professional engineer registered in Massachusetts. The engineer shall be familiar with the specifications of AASHTO for the lobby roof and be experienced in this technical field. All submitted sheets shall be stamped by the supervising engineer. This submission shall not relieve the Contractor of his responsibility for providing the proper methods, equipment, workmanship, or safety precautions. As a minimum the following information shall be included in the submittal:

- Plan showing the location of all roadways, utilities, railroad tracks and other appurtenances in the area of erection.
- The location of cranes, both horizontally and vertically, and their operating radii.
- The lifting equipment information including rating data. Information shall include counterweights to be used and boom capacity. The capacity of the crane and of all lifting and connecting devices shall be adequate for 125% of the total pick load including spreaders and other material except that in the area of railroads or other traffic, the capacity shall be adequate for 150% of the total pick load.
- The type, size and arrangement of slings, shackles or other lifting and connecting devices including relative technical data.
- The order of lifts, repositioning of equipment and counterweights, and location and method of attaching deadmen.

- Method and materials for temporary structures or the strengthening or bracing of a member (either temporarily or permanently) for erection purposes.

5. Shop Drawings Detailing Fabrication of AESS Components:

   a. Provide erection Drawings clearly identifying which members are to be AESS;
   b. Include details that clearly identify all the requirements listed for AESS in Articles 3.01 and 3.02, herein. Provide connections for exposed AESS consistent with concepts shown on Architectural and Structural Drawings.
   c. Indicate welds by standard AWS symbols. Distinguish between shop and field welds. Show sizes and types of each weld. Identify grinding, finish and profile of welds.
   d. Indicate type, size, finish and length of bolts.
   e. Indicate special tolerances and erection requirements as noted on the Drawings or defined herein.

Under Subsection 1.03B; revise Subparagraph 1 to read as follows and add Subparagraph "7:

1. Welding shall not commence until welding procedures and welder certifications have been approved by the Engineer. All welding procedures shall conform to the applicable welding code (i.e., AASHTO/ AWS Bridge Welding Code, the AWS Structural Welding Code – Aluminum, AWS Structural Welding Code – Reinforcing Bars, etc.) as determined by the Engineer. Shop welders shall be certified in accordance with the applicable AWS Welding Code as determined by the Engineer.

7. For the Custom Ceiling support, submit field in process and final welding inspection reports performed by an American Welding Society (AWS) Certified Welding Inspector (CWI).

Under Subsection 1.03; add Paragraphs D through G as follows:

D. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

   1. High-strength bolts (each type), including nuts and washers.

      a. Include Direct Tension Indicators.

E. Certified copies of each survey conducted by a licensed Land Surveyor registered in the Commonwealth of Massachusetts, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

F. Submit qualifications of the Certified Independent Testing Laboratory proposed to conduct Specialty Welding Tests and inspections.

G. Submit certification that the Primary Fabricator and any fabricator of sub-contracted work and the Erector meet the requirements of 1.02.

1.04 PRODUCT DELIVERY, HANDLING AND STORAGE

Under Subsection 1.04; add Paragraphs G through J as follows:

G. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

H. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in place concrete or masonry, in ample time to not to delay work.

I. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

J. Store and handle AESS using padded slings or methods such that AESS is not damaged. Provide padding as required to protect while rigging and aligning member frames. Weld tabs for temporary bracing and for safety cabling at points concealed from view in the completed structure.

PART 2 - PRODUCTS

2.02 STRUCUTRAL STEEL for OTHER STRUCTURES

Under Subsection 2.02; revise Paragraph "A" to read as follows:

A. General: ASTM A709/A572 Grade 50 or ASTM A 992.

2.05 FASTENERS

Under Subsection 2.05; revise Paragraphs "B, D, and E" to read as follows:

B. 2. Direct tension indicator (DTIs) required for all ASTM A325 bolts shall conform to ASTM F959, type 490 requirements.

D. Lubricant for Bolts: Molybdenum disulfide base per ASTM D4673.

E. Anchor Rods: ASTM F1554, grade 105, hot dipped galvanized or ASTM A449.

2.06 SHEAR STUD CONNECTORS

Under Subsection 2.06; revise as follows:

Shear Stud Connectors:

Commonwealth of Massachusetts Highway Department Standard Specifications for Highway and Bridges, Section M8.04.1.

PART 3 - EXECUTION

3.01 FABRICATION

Under Subsection 3.01.A; delete Subparagraph "5" in its entirety and substitute the following:

5. AREMA Manual for Railway Engineering.

Under Subsection 3.01.B; revise to read as follows:

B. Near white blast clean all steel in accordance with SSPC-SP10 whether the steel is to be painted or fire-proofed.

Under Subsection 3.01; delete Paragraph "J" in its entirety and substitute the following:

J. Welding: In accordance with AWS D1.5 or AWS D1.1 as applicable.

Under Subsection 3.01; add the following new paragraphs N through R to read as follows:

N. Corrective Work: Structural steel members or assemblages having fabrication errors, or which exceed permissible tolerances shall be corrected only if permitted by the Engineer. All corrective work shall be in accordance with AISC and AWS requirements. When requested by the Engineer, or Testing Laboratory, the Contractor shall submit to the Engineer for approval, drawings showing details of proposed corrective work and shall receive approved drawings prior to performing the corrective work. All corrective work shall be solely at the Contractor's expense.

O. Identification: All structural steel members shall have assigned positions and identification mark or symbol, plainly indicated thereon near one end. Marks shall agree with those given on the shop drawings and erection drawings relating to or calling of the member.

P. Bolts, nuts, direct tension indicators and washers from each rotational-capacity shall be shipped in the same container. If there is only one production lot number for each size of nut and washer, the nuts and washers may be shipped in separate containers. Each container shall be permanently marked with the rotational-capacity lot number such that the identification will be possible at any stage prior to installation.

Q. Fabrication of AESS: Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Engineer. Detail AESS assemblies to minimize field handling and expedite erection.

1. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up. Use special care in handling and shipping of AESS both before and after shop painting.

2. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques.

a. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice Section 10.
b. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within + 1/16 in., - 0 in. of plate thickness.
c. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.

d. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.

e. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

f. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8 in. ± 1/32 in. at all copes and blocks.

g. Joint Gap Tolerance: Maintain a uniform gap of 1/8 in. ± 1/32.

h. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.

i. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator may fill and/or grind to a surface finish consistent with the approved mock up.

j. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flame cut steel to match approved mockup.

k. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem and of outstanding flanges or legs of angles shall be visibly acceptable to the engineer from a distance of 20 feet under any lighting condition determined by the Engineer. Tolerances for the vertical and horizontal walls of rectangular AESS members after rolling shall be the specified dimension ± 1/2 in.

l. Seal Welds: Seal weld open ends of round and rectangular hollow structural section with 3/8 in. closure plates. Provide continuous, sealed welds at angle to gusset plate connections and similar locations where AESS is exposed to weather.

m. Shop Weld Connections: Comply with AWS Dl.1. Appearance and quality of welds shall be consistent with the mock-up. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this section.

R. Shop Priming:

1. Shop prime AESS surfaces, except the following:

   a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   b. Surfaces to be field welded.
   c. Surfaces to be high-strength bolted with slip-critical connections, if primer does not meet the specified AISC slip coefficient.

2. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC Specifications as follows:

   a. SSPC-SP 10 "Near White Blast Cleaning"
   b. Coordinate the required blast profile with the approved paint submittal prior to commencing surface preparation.

3. Priming: Immediately after surface preparation, apply primer paint according to manufacturer's instructions to provide a Dry Film Thickness of not less than 3.5 mils. Use

primer paint as specified under Section 09900, PAINTING. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

a. Stripe paint corners, crevices, bolts, welds, and sharp edges.
b. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

3.02 ERECTION

Under Subsection 3.02F; revise Subparagraph "1" and add Subparagraph 5 as follows:

1. Tensioning high strength bolts shall be in accordance with calibrated wrenches or as indicated by direct tension indicator manufacturer.

5. Installation of high strength bolts shall be in accordance with the current edition of the Specification for Structural Joints Using ASTM A325 or A490 Bolts, Approved by the Research Council on Structural Connections of the Engineering Foundation, June 23, 2000.

   a. Regardless of the tightening method used, particular care should be exercised so that the snug tight condition is achieved. In addition, the rotational-capacity tests described above shall be performed on each rotational-capacity lot number prior to the start of bolt installation. Hardened washers are required as part of the test even though they may not be required in the actual bolt assembly.

   b. A Skidmore-Wilhelm Calibrator or an acceptable equivalent tension measuring device shall be required at the job site during erection. The Contractor shall submit to the Engineer a certification that the calibrating device has been checked by qualified personnel acceptable to the Engineer within the previous 30 days. The device must also be checked for accuracy upon completion of the work on the project and proof of certification must be submitted to the Engineer. Bolts that are too short for the Skidmore-Wilhelm Calibrator may be tested using direct tension indicators. The DTIs must be calibrated in the Skidmore using longer bolts.

Under Subsection 3.02; add the following new Paragraphs "M through O":

M. Field Welding:

1. Omit paint or other coating from steel surfaces at locations of field welds, and touch-up with zinc-rich compound or paint as required for the surrounding steel only after the work has been completed.

N. Erection of AESS:

1. Provide connections for temporary shoring, bracing and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Engineer. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the AESS through the process of erection.

2. Set AESS accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

3. In addition to the special care used to handle and erect AESS, employ the following erection techniques:

   a. AESS Erection Tolerances: Erection Tolerances shall meet the requirements of Chapter 10 of the AISC "Code of Standard Practice".
   b. Field Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces each side and be within + 1/16 in., - 0 in. of plate thickness.
   c. Contouring and blending of field welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.
   d. Continuous Field Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
   e. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
   f. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
   g. Removal of field connection aids: Run out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up, and welding in the field shall be removed from the structure. Field groove welds shall be selected to eliminate the need for backing bars or to permit their removal after welding. Welds at run out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth.

4. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.

5. Splice members only where indicated.

6. Obtain permission for any torch cuffing or field fabrication from the Engineer. Finish sections thermally cut during erection to a surface appearance consistent with the mock-up.

7. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where boles cannot be aligned with acceptable final appearance.

8. Welded Connections: Comply with AWS Dl.1 for procedures, and appearance.

   a. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
   b. Obtain Engineer's approval for appearance of welds in repaired or field modified work.

O. Field Touch Up

1. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint shall completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer's instructions as specified in Section 09900, Painting.

2. Steel to receive spray applied fire-resistant coating shall be cleaned of dirt grease and loose mill scale in accordance with section 3.01B prior to application of coating. Prepare substrate to be compatible with material specified in Specification Section 09841.

PART 4 - MEASUREMENT AND PAYMENT

Under Part 4 – Measurement and Payment, delete Subsection 4.01 in its entirety and substitute the following:

4.01 MEASUREMENT

A. Only structural steel incorporated into the completed work will be measured for payment under this section. Temporary supports, jigs, jacking frames, blocking, or any other temporary device or structure with the Contractor finds necessary to safely construct the work will not be measured separately for payment.

B. Architecturally Exposed Structural Steel (AESS) shall be measured as "Structural Metal" separately from other structural steel.

C. Structural steel will be measured by the pound, calculated without deduction for holes under 12 inches longest dimension, for each item, and type, complete and in place, regardless of material grade. Measurement shall be based only on computed masses of steel complete in place in the structure. No additional allowance in mass shall be made for the shop coat of paint or any coat of paint or other protective coating. The mass of the rolled shapes and of the plates, regardless of the width of the plates, shall be computed on the basis of their nominal mass and of their dimensions as shown on the approved shop drawings, deducting for copes and cuts, and for all open holes that are not filled with rivets, bolts or plug welded.

D. Stud shear connectors affixed to steel measured under this section will be measured per each type and size.

E. Shims, wedges, fasteners, metallic coating, and setting bearing plates including dry packing, will not be measured separately for payment, but all costs in connection therewith will be considered incidental to the applicable items of structural steel work. Fasteners shall include the weight associated with the bolted connections, including all washers and nuts.

F. High Strength Threaded steel Anchor rods will be measured by the pound, with all nuts, washers, plates, and other accessories, complete and in place, regardless of diameter, length, or grade.

G. Drilling, welding, independent testing agencies and all other work associated connections and erection, whether performed in the shop or in the field will not be measured separately for payment, but all cost in connection therewith will be considered incidental to the work to which it pertains. Computed weights shall not include the weight of welds.

4.02 PAYMENT Payment for structural steel will be made at the Contract unit price for the quantities determined as specified above.

4.03 PAYMENTS ITEMS

Item No.	Description	Unit
0510.100	Structural Metal	LB
0510.350	Structural Steel	LB
0512.118	Replace Miscellaneous Rivets With High Strength Bolts	EA
0525.200	Stud Shear Connectors	EA
0511.004	High Strength Threaded Anchors	LB

END OF SECTION

SECTION 05500

MISCELLANEOUS METAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section Specifies furnishing and installing miscellaneous metal items, including steel and aluminum shapes, in accordance with Standard Specifications Construction Section 05500, except as modified herein.

D. Provide all expansion bolts, toggle bolts, lugs, shims, brackets, hood bolts, expansion shields, anchors, angle clips, plates, fastenings and all other items of miscellaneous metal shown on the drawings or required to complete the work, except that which is specified as work of other specification sections.

E. Coordinate all work of this section with the work of other trades. Take all necessary field measurements prior to starting fabrication or beginning shop drawings.

F. Furnish items included as work of this section that are to be built into work of other trades. Furnish all necessary templates and information required by those trades to properly locate such items.

G. The work of this section includes, but is not limited to, the following:

1. Ladders.
2. Miscellaneous steel lintels.
3. Miscellaneous shelf angles not indicated as work of Section 05100, Structural Steel.
4. Miscellaneous framing and supports.
5. Elevator subsill angles.
6. Miscellaneous bearing and leveling plates.
7. Metal stair systems.
8. Steel handrails, guardrails and railings.
9. Expansion joint steel framing.
10. Steel frames for signage and map panels.

1.03 SUBMITTALS

E. Standards and Codes: Submit the following standards and codes of latest edition, which shall hereby form a part of these Specifications:

1. AISI; All applicable standards.
2. AISC; Code of Standard Practice for Steel Buildings and Bridges.
3. AISC; Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
4. Federal Specs.; QQ-1-652A for Iron Gray Castings.
5. Federal Specs.; QQ-S741a for Steel Plates, Shapes and Bars, Carbon or Structural.
6. Federal Specs.; P521 Malleable Iron.

7. Structural Welding Code D1.1-80.
8. NAAMM for Architectural Metal, applicable publications.

F. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress; allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot-dip galvanized after fabrication.

G. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Show how design load requirements and other performance criteria have been satisfied.

1.05 QUALITY ASSURANCE

A. The Authority's Testing Laboratory retains the right to inspect and/or test all work and materials, at any stage of the work, in the shop or wherever the work is being performed or wherever the materials are being stored.

B. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts, to design and certify that the work of this section meets or exceeds the performance requirements specified in this section.

C. Shop fabricate work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.

D. Perform welding in compliance with American Welding Society Code.

1.06 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:

1. Division 3 - Concrete
2. Section 05041 - Hot-Dip Galvanizing.
3. Section 05100 - Structural Steel
4. Section 09100 - Metal Support Systems; Metal framing.
5. Section 09900 - Painting
6. Section 09910 - Shop Painting of Galvanized Steel

1.07 PROJECT CONDITIONS

A. Do not permit use of stairs, ladders, or other work until work is completely and fully installed and ready to assume its intended design loads. Do not permit overloading of any miscellaneous metal system. Do not permit use of concrete filled metal pan stair systems before concrete is placed and cured.

PART 2 - PRODUCTS

2.01A GENERAL

A. Provide all materials from new stock, free from defects impairing strength, durability, and appearance, and of best commercial quality for the purpose specified.

B. Standard manufactured products meeting the general requirements will be acceptable if details of construction and installation are approved by the Engineer. Include all supplementary parts to complete each item, even though such parts are not definitely shown or specified.

C. Provide all exposed fasteners of the same material, color and finish as the fastened material, unless otherwise indicated.

D. Provide all exposed fasteners vandal-proof (spanner-head type), unless otherwise noted.

E. Provide all concealed fastenings and shims, lugs, expansion shields and other similar items as follows:

1. Stainless steel in conjunction with stainless steel work.
2. Non-magnetic stainless steel or aluminum in conjunction with aluminum work.
3. Hot-dip galvanized in all other locations, unless otherwise indicated.
4. Isolate dissimilar metals from each other with heavy-coat of asphaltum bituminous zinc chromate paint. Provide Teflon washers in exposed locations.

2.01 CARBON STEEL

I. Steel Plate: ASTM A 283, prime grade cold-rolled steel properly annealed and process leveled and having smooth, clean surfaces.

2.06 FASTENERS

A. General

2. Material:

d. Stainless Steel Fasteners: Where indicated, provide Type 304 stainless steel socket head hexagon fasteners. Provide acorn nuts where indicated.

2.11 PAINT

A. Galvanized Steel Items Indicated to be Painted: Provide shop paint as specified in Section 09910, Shop Painting of Galvanized Steel.

C. Non-Galvanized Steel Items Indicated to be Painted: Provide shop prime paint conforming to Section 09900 Painting.

2.12 METALLIC COATINGS

B. Zinc:

1. All steel items indicated on the drawings and by these specifications to be galvanized, shall be hot-dip galvanized after fabrication in accordance with Section 05041, Hot-Dip Galvanizing.

2.14 MISCELLANEOUS MATERIALS

A. Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C621, type D.

B. Concrete: Comply with requirements of Section 03300 - Cast-In-Place Concrete.

PART 3 - EXECUTION

3.01 FABRICATION

A. General

4. Fabricate work to be truly straight, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.

5. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the work of this project.

6. Coordinate miscellaneous metal requirements with other Specification Sections to ensure proper interface of various parts of the work.

7. Obtain loading requirements from suppliers of work to be supported and design and fabricate support systems with factor of safety of at least 6.

8. Work Exposed To View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

9. Galvanizing: Hot-dip galvanize all miscellaneous metalwork in strict accordance with Section 05041, Hot-Dip Galvanizing.

   a. The Engineer shall be notified 48 hours in advance of shipping of fabricated items to galvanizing plant. The Engineer will then view and inspect all fabricated items prior to shipping to galvanizer for smoothness of fabricated item surfaces.

10. Touch Up: Touch-up damaged or abraded galvanized surfaces in strict accordance with Section 05041, Hot-Dip Galvanizing.

B. Fabricated Products:

2. Ladder Fabrication: Comply with ANSI A14.3 and OSHA. Unless otherwise indicated, provide 3/8" x 1-1/2" bar side rails spaced 18" apart with no. 5 deformed steel rebar rungs at 12" on center vertically. Provide extended siderails at least 42" above top rung and return to wall or structure. Fit rungs in holes drilled in siderails. Weld and grind smooth to touch. Securely anchor each ladder siderail with clip angles at top, bottom and intermediate points spaced not more than 5'-0" on center. Provide 7" clearance from walls to centerline of rungs.

8. Stair Fabrication: Design and fabricate stair systems to conform to size and arrangements shown and required. Comply with applicable codes and ordinances related to fire exit stairs.

a. Design stair system to support design live load of 150 lbs./ft^2 or a concentrated load of 300 pounds at a location to cause greatest stress, whichever is greater. Design anchors, connections, support brackets and all other interfaces with the supporting structure.

b. Take field measurements to accurately determine actual floor to floor heights and fabricate stairs so that all risers in each run are of equal height within ± 1/16" and so that the average height of risers in two adjacent runs do not vary by more than 3/16".

c. Fabricate stringers from steel channels or plates. Form metal tread and landing pans from 12 gage minimum steel sheet to the shape shown on approved shop drawings. Weld tread and landing pans to supporting frames.

d. Shop weld and assemble stair system to the greatest extent possible. Locate bolted connections in inconspicuous areas.

e. All exposed joints shall be ground smooth. All welds shall be continuous and even in appearance.

9. Steel Handrails and Guardrails: Conform to ASTM E 985 for design and engineering for structural performance based on testing performed in accordance with ASTM E 894 and ASTM E 935, using load and deflection values specified below. Design and fabricate handrails and guardrails to support 50 lb. per linear foot uniform load and 300 lb. concentrated load, located at any point to cause greatest stress horizontally or vertically.. Load conditions do not act concurrently. Design maximum deflection of any member under load conditions shall not exceed L/360.

a. Provide members of type, size, style and profile indicated, unless otherwise required to support loads. Provide standard steel pipe rails to greatest extent possible to meet applicable design load requirements.

b. Provide fully welded construction, using internal slip connectors. Grind joints smooth and flush so that joints are invisible after painting.

c. Provide coped joints at member intersections, fully welded all around. Provide mitered connections at square turns unless radius turns are indicated.

d. Provide smooth radii at bends and maintain uniform cross-section throughout with no kinks, cracks, buckling or twisting.

e. Return ends to walls with concealed anchors, except where detailed not to return to wall.

f. Close ends with 1/8 in. steel plate, or hemispherical fittings.

g. Provide toe boards fabricated to dimensions and details indicated.

h. Provide brackets, flanges, fittings and anchors for connecting railings to railing, railings to floors, landings, stringers, and walls.

i. For railing posts set in concrete, fabricate sleeves from steel pipe not less than 6 in. long, and with an inside diameter not less than 1/2 in. greater than outside diameter of post with a steel plate closure welded to bottom of sleeve. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 in. below finished surface of concrete.

j. Where removable railing posts are indicated, provide slip-fit sockets fabricated from steel pipe with an inside diameter sized for a close fit with posts, so that deflection of post at top is limited to 1/12 of post height.

10. Lintel Fabrication: Fabricate lintels for openings and recesses in walls and partitions where shown and elsewhere as needed. Provide at least 8" bearing at each end, unless otherwise detailed. Weld together individual members of composite lintels made up of more than one member. The following schedule for steel lintels shall be used for the opening sizes indicated below. All lintels required shall be 12" longer than the masonry openings. Set long legs vertical. Furnish lintels for installation under Section 04200. Weld all back-to-back lintels.

Max. Masonry Opening	Wall Thickness
	4" Walls
3'-0" (and under)	1L 3-1/2" X 3-1/2" X 1/4"
4'-0"	1L 4" X 3-1/2" X 1/4"
5'-0"	1L 5" X 3-1/2" X 1/4"
6'-0"	1L 6" X 3-1/2" X 1/4"
	6" Walls
3'-0" (and under)	2Ls 3" X 2-1/2" X 1/4"
4'-0"	2Ls 3" X 2-1/2" X 1/4"
5'-0"	2Ls 3-1/2" X 2-1/2" X 1/4"
6'-0"	2Ls 3-1/2" X 3-1/2" X 1/4"

8" Walls

2'-0" (and under)	2Ls 3-1/2" X 3-1/2" X 1/4"
3'-0"	2Ls 3-1/2" X 3-1/2" X 1/4"
4'-0"	2Ls 4" X 3-1/2" X 1/4"
5'-0"	2Ls 4" X 3-1/2" X 1/4"
6'-0"	2Ls 5" X 3-1/2" X 1/4"

12" Walls

2'-0" (and under)	3Ls 3-1/2" X 3-1/2" X 1/4"
3'-0"	3Ls 3-1/2" X 3-1/2" X 1/4"
4'-0"	3Ls 4" X 3-1/2" X 1/4"
5'-0"	3Ls 4" X 3-1/2" X 1/4"
6'-0"	3Ls 5" X 3-1/2" X 1/4"
7'-0"	3Ls 5" X 3-1/2" X 1/4"
8'-0"	3Ls 6" X 3-1/2" X 1/4"
9-0"	3Ls 6" X 3-1/2" X 1/4"

11. Bearing and Leveling Plate Fabrication: Design and fabricate plates for steel and wood members bearing on masonry or concrete. Provide flat, uniform bearing areas of size and thickness required for loading conditions encountered. Use standard AISC and AITC design criteria. Drill plates as necessary to receive anchor bolts and for grouting access.

12. Shelf Angle Fabrication: Fabricate to sizes shown or indicated on approved shop drawings. For anchoring to structure, provide slotted holes for 3/4" bolts not more than 6" from ends and not more than 4' on center. Coordinate anchorage with structural steel shop drawings to ensure proper location of bolts and fasteners.

13. Elevator Support Sill Fabrication: Provide continuous, concealed support angle for elevator sill. Coordinate requirements for size, load and anchorage with Elevator Supplier. Provide anchors spaced not more than 2' on center.

14. Rough Hardware: Provide standard and custom fabricated bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to properly complete the work of the project.

D. Workmanship:

1. Contractor shall obtain the exact dimensions and grades, and will be held responsible for the accurate execution of the work. Conceal all fasteners where possible. Grind smooth all welds, continuously and neatly.

2. Provide all work true to details, well formed to shape and size, straight, with sharp well-defined lines and arises. Metal surfaces shall be clean and free from mill scales, flake rust and rust pitting.

3. Provide all cutting, punching, drilling, and tapping required for attachment of hardware and of work by other trades where so indicated or where directions for same are given prior to or with approval of shop drawings.

4. Weld all permanent connections. Welds shall be continuous except where tack-welding is permitted by Engineer.

5. Form all joints exposed to weather in such a way as to exclude water.

3.02 ERECTION AND INSTALLATION

A. All materials shall be carefully handled and stored in such a way to prevent deformation and damage. Take special care to protect all paint shop coatings.

B. Erect all work square, plumb and true, accurately fitted, and with tight joints and intersections. Unless otherwise shown, all connections which will be exposed shall be welded and ground smooth, and, if galvanized, touch up in strict accordance with Section 05041, Hot-Dip Galvanizing.

C. Provide suitable anchors and fasteners to connect miscellaneous metal items to other construction. Provide setting templates and diagrams and coordinate with other work so that adequate anchor bolts, blocking and bracing is in place and accurately located. Beginning work means Installer accepts substrates and conditions.

D. Set work accurately and truly plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated work.

E. Fill stair system tread and landing pans with concrete, and cure and finish in strict compliance with the requirements of Section 03300 - CAST-IN-PLACE CONCRETE. Provide very light non-slip broomed surface where no finish material is indicated. Obtain Engineer's approval of finish texture before beginning work.

F. For bearing and leveling plates, clean concrete and masonry bearing surfaces and roughen to improve bond. Thoroughly clean steel bearing surfaces. Set loose plates on shims or wedges. Level and plumb work, then tighten anchor bolts. Cut off protruding shims and wedges and pack voids solidly with grout.

G. Install elevator sill support angle at locations and position directed by elevator supplier. Securely anchor to supporting structure in compliance with approved shop drawings.

3.03 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
2. Allowable Variation from True Level: ± 1/8" in 20'-0"
3. Allowable Variation from True Line: ± 1/8" in 20'-0"

3.04 REPAIRING, CLEANING, & PROTECTION

A. Touch-up damaged coatings and finishes to eliminate evidence of repair.

B. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0550.000	Miscellaneous Metals	Lump Sum

-END OF SECTION-

SECTION 05700

ORNAMENTAL METALWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the following:

1. Custom stainless steel handrail and railings.
2. Custom galvanized steel fences and gates.
3. Custom stainless steel benches and supports.
4. Custom steel benches and supports.
5. Custom steel telephone enclosures.
6. Custom stainless steel grilles.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this section.

B. Other specifications sections that directly relate to work of this section include, but are not limited to:

1. Section 03300 - Cast-In-Place Concrete.
2. Section 05041 - Hot-Dip Galvanizing.
3. Section 05500 - Miscellaneous Metals; Steel handrails and railings.
4. Section 09910 - Shop Painting of Hot-Dip Galvanized Steel.

1.03 QUALITY ASSURANCE

A. Installer: A firm which has experience in work of the type required by this section.

B. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

C. Mock-ups: Before beginning primary work of this section, provide mock-ups at locations acceptable to Engineer and obtain Engineer's acceptance of visual qualities for each type of work. Protect and maintain acceptable mock-ups throughout the work of this section to serve as criteria for acceptance of this work. Provide mock-ups as follows:

1. Provide one 10 ft. long mock-up of each of the handrail types.

D. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts, to design and certify that the work of this section meets or exceeds the performance requirements specified in this section.

E. Shop Assembly: Preassemble all items specified as work of this section to the greatest extent possible to minimize field splicing. Disassemble units as required for shipping and

handling. Clearly mark units for reassembling in the field.

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performances: Provide installed handrail and railing assemblies complying with the following structural performances, unless otherwise indicated:

1. Handrails and Toprails: Capable of withstanding 300 lb. concentrated loads applied at any point, any direction, and uniform loads of 100 lb. per lineal feet. These two load conditions do not act concurrently.

2. Guards: Provide intermediate rails, balusters and panel fillers capable of withstanding uniform loads of 100 lbs. per sq. ft. of gross area of guard, including open areas. This load does not act concurrently with concentrated and uniform loads acting on handrails and top rails.

3. All guards shall comply with provisions of Massachusetts 780 CMR including Section 1615.5 Guardrails and Handrails. All infill panels shall be designed and constructed to withstand a 200 lb. Concentrated load applied in any direction over 1 sq. ft. of area with a 4x safety factor."

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Provide shop drawings stamped and signed by a professional engineer licensed to practice in the Commonwealth of Massachusetts.

C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Allow for field cutting and fitting where taking field measurements before fabrication is not possible.

D. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Show how design load requirements and other performance criteria have been satisfied.

E. Samples: Submit representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected. Provide minimum 12" square samples of each color and finish required. Provide samples of all exposed fittings and brackets.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver railings and posts wrapped in manufacturer's standard protective coverings. Deliver brackets, fittings, sleeves, fasteners and other miscellaneous materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT CONDITIONS

A. Weather: Perform exterior work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Proceed with work only when substrate construction is complete.

1.08 SEQUENCING AND SCHEDULING

A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Stainless Steel Materials: Provide stainless handrail products of one of the following manufacturers that meet or exceed the requirements of these specifications, or Engineer approved equal:

1. Julius Blum & Co., Inc.
2. Craneveyor Corp.
3. KDI Paragon Inc.

2.02 MATERIALS AND PRODUCTS

A. Stainless Steel: Comply with the following standards and requirements for stainless steel components:

1. Tubing: ASTM A 554, Grade MT 316.
2. Pipe: ASTM A 312, Grade TP 316.
3. Castings: ASTM A 743, Grade CF 8M or CF 3M.
4. Plate: ASTM A 167, Type 316.
5. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type **316**.
6. Bars and Shapes: ASTM A 276, Type **316**.

B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required:

1. Extruded Bars and Shapes: ASTM B 221 (ASTM B 221M), 6063-T6.
2. Extruded Pipe and Tubes: ASTM B 429, 6063-T6.
3. Drawn Seamless Tubes: ASTM B 483 (ASTM B 483M), 6063-T832.
4. Plate and Sheet: ASTM B 209 (ASTM B 209M), 6061-T6.
5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), 6061-T6.
6. Castings: ASTM B 26/B 26M, A356-T6.

C. Steel: Provide as follows:

1. Tubing: ASTM A 500 (cold formed).
2. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

3. Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Castings: Either gray or malleable iron, unless otherwise indicated.

   a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
   b. Malleable Iron: ASTM A 47/A 47M.

5. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial quality or lock-forming quality, stretcher-leveled standard of flatness.

2.03 MISCELLANEOUS MATERIALS AND PRODUCTS

A. Non-Shrink, Non-Metallic Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C621.

B. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended for color match, strength and compatibility in the fabricated items.

C. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as metal being fastened, unless otherwise indicated.

   1. Concealed Fasteners: Provide concealed fasteners for the interconnection of handrail and railing components, and for all other connections, except where exposed fasteners are unavoidable.

   2. Exposed Fasteners: Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Anchors and Inserts: Furnish inserts and anchors to be set in concrete or masonry, of proper type, size and material for loading conditions indicated. Use toothed steel or lead expansion bolt assemblies for drilled-in-place construction.

   1. Provide units with exposed surfaces finished to match finish and texture of the metal being anchored.

E. Bituminous Paint: SSPC-Paint (Cold-applied asphaltic mastic).

2.04 FABRICATION

A. General: Fabricate work of this Section to design, dimensions and details shown. Provide members in sizes and profiles indicated, with posts and brackets of site and spacings shown, but not less than required to support indicated design loads.

B. Fabricate work to be truly straight, plumb, level and square.

C. Brackets, Flanges, Fittings and Anchors: Provide brackets, flanges, fittings and anchors for the interconnection of handrail and railing components to other work.

D. Work Exposed To View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws, or acorn head screws and bolts as indicated.

E. Welded Connections: Perform welding to comply with AWS for recommended practices, using method appropriate for metal and finish indicated. Grind exposed welds flush and smooth to blend with adjoining finish metal surfaces.

F. Bends: Form bends by use of prefabricated elbow fittings and radius bends, as applicable.

G. Curves: Form simple and compound curves by bending members in jigs designed to produce uniform curvature with uniform profile of member throughout entire bend without buckling, twisting or deforming in any way.

H. Close exposed ends of all handrail and railing members using manufacturer's standard fittings.

I. For exterior handrails and railings, and interior units exposed to moisture, provide weep holes or other means of draining entrapped water in hollow sections of railing members.

J. At custom stainless steel grilles, provide stainless steel birdscreens, including stainless steel channel frame and 1/2 in. square stainless steel mesh.

2.05 FINISHES

A. Stainless Steel Finish: Provide stainless steel finishes as listed below.

1. Stainless Steel Finish: AISI Finish No. 4.

B. Aluminum Finish: Properly prepare substrates by inhibited chemical cleaning, conversion coating, and priming in compliance with coating manufacturer's instructions and recommendations. Provide minimum 1.0 dry film thickness of thermo-cured fluorocarbon coating containing minimum 70% of one of the following resins:

1. Hylar 5000; Ausimont USA, Inc., Morristown, NJ 07962-1838
2. Kynar 500; Atochem North America, Inc., Philadelphia, PA 19102.

C. Galvanizing: All ferrous metal items, such as steel benches and supports and steel telephone enclosures, shall be hot dip galvanized after fabrication in conformance with Section 05014, HOT DIP GALVANIZING.

D. Painting of Galvanized Steel Items: Galvanized steel items shall be finished in accordance with Section 09910, SHOP PAINTING OF HOT-DIP GALVANIZED STEEL.

E. Colors: To be selected by Engineer from manufacturer's complete line of standard, premium, and deluxe colors

1. Exposed screws, fastenings, etc., shall be of matching color.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory

conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION, INSTALLATION/ERECTION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

B. Installation, General: Provide anchorage devices and fasteners necessary for fastening systems to in-place construction using manufacturer's standard connections. Coordinate and furnish anchorages, templates, setting drawings, instructions and recommendations for installation of items embedded in concrete or masonry construction.

C. Corrosion Protection: Coat concealed surfaces of aluminum with heavy coat of bituminous paint when aluminum surfaces will be in contact with grout, concrete, masonry, wood or dissimilar metals.

D. Adjust work of this Section prior to anchoring to ensure matching alignments at abutting joints. Space posts at intervals indicated, or as required by design loading, whichever dimension is less.

3.03 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
2. Allowable Variation from True Level: ± 1/8" in 20'-0"
3. Allowable Variation from True Line: ± 1/8" in 20'-0"

3.04 ADJUSTING, CLEANING, TOUCH-UP, AND PROTECTION

A. Touch-up damaged coatings and finishes to eliminate evidence of repair.

B. Repair minor damage to eliminate all evidence of repair. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0570.000	Ornamental Metal	Lump Sum

- END OF SECTION -

SECTION 05705

STAINLESS STEEL COLUMN COVERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies column covers. including, but not limited to, the following:

1. Stainless steel column covers.
2. Back-up framing and attachment systems.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements that affect the work of this section.

B. Other specifications sections that directly relate to the work of this section include, but are not limited to, the following:

1. Section 07920 - Sealants and Caulkings

1.03 QUALITY ASSURANCE

A. Installer: A firm which has experience in work of the type required by this section and which is acceptable to the manufacturers of the primary materials.

B. Source: Provide each column cover type that are the products of one manufacturer. Provide secondary materials, framing, moldings and accessories which are acceptable to the column cover manufacturer.

1.04 TESTS

A. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E84 are classified as Class A.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect

from all possible damage. Sequence deliveries to avoid delays, but minimize on-site storage.

PART 2 - PRODUCTS

2.01 STAINLESS STEEL COLUMN COVERS

A. Provide products of one of the following manufacturers:

1. Carlson Metalcraft.
2. KPK Stainless
3. Prismatic Div. of B&M Finishers, Inc.
4. Una-Clad, Inc.

B. Stainless Steel Type and Thickness: Provide type 316 stainless steel, in the following minimum thickness of stainless steel:

1. 14 gage.

C. Provide manufacturer's standard plain stainless steel with hard clear coating.

D. Moldings: Provide stainless steel moldings as recommended and approved by column cover manufacturer.

E. Framing and Fasteners: Provide framing and fastener systems as recommended by manufacturer for installing column covers to substrates.

F. Accessories: Provide all necessary sealants, components and accessories as recommended by column cover manufacturer for a complete installation.

2.02 STAINLESS STEEL FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are not acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

D. Remove or blend tool and die marks and stretch lines into finish.

E. Grind and polish surfaces to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

F. Stainless Steel Finish: AISI No. 4 finish.

2.03 FRAMING AND SUPPORTS

A. Provide all necessary framing back-up and supports for column covers.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

B. Mechanically attach column covers to substrates indicated.

3.03 TOLERANCES

A. The following allowable installed tolerances shall govern acceptance of the work:

1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
2. Allowable Variation from True Level: ± 1/8" in 20'-0"
3. Allowable Variation from True Line: ± 1/8" in 20'-0"
4. Allowable Variation from True Plane of Adjacent Surfaces: ± 1/16"

3.04 CLEANING AND PROTECTION

A. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned or repaired.

B. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM	DESCRIPTION	UNIT
0550.986	Stainless Steel Column Covers	Lump Sum

- END OF SECTION -

SECTION 05706

STAINLESS STEEL WALL PANELS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the following:

1. Custom stainless steel wall panels including furring channels and attachment devices.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this section.

B. Other specifications sections that directly relate to work of this section include, but are not limited to:

1. Section 05700 - Ornamental Metalwork; Stainless steel handrails, guardrails, fences and gates.
2. Section 05705 - Stainless Steel Column Covers.
3. Section 14311 - Escalators.

1.03 QUALITY ASSURANCE

A. Installer: A firm which has experience in work of the type required by this section.

B. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

C. Shop Assembly: Preassemble all items specified as work of this section to the greatest extent possible to minimize field splicing. Disassemble units as required for shipping and handling. Clearly mark units for reassembling in the field.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorages, connections and accessory items.

C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Field cutting and fitting will not be permitted.

D. Samples: Submit representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected. Provide minimum 12" square samples of wall panels, including a cut-away corner condition. Provide samples of all exposed fittings and attachment devices.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver panels wrapped in manufacturer's standard protective coverings. Deliver attachments, fittings, fasteners and other miscellaneous materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products of one of the following manufacturers:

1. Carlson Metalcraft.
2. KPK Stainless
3. Prismatic Div. of B&M Finishers, Inc.

B. Stainless Steel Type and Thickness: Provide type 316 stainless steel, in the following minimum thickness of stainless steel:

1. 14 gage.

C. Provide manufacturer's standard plain stainless steel with hard clear coating.

D. Moldings: Provide stainless steel moldings as recommended and approved by wall panel manufacturer.

E. Framing and Fasteners: Provide framing and fastener systems as recommended by manufacturer for installing metal panels to substrates.

F. Accessories: Provide all necessary sealants, components and accessories as recommended by wall panel manufacturer for a complete installation.

2.02 FABRICATION

A. General: Fabricate wall panels to design, dimensions and details shown. Provide panels in sizes and profiles indicated.

B. Fabricate work to be truly straight, plumb, level and square.

C. Brackets, Flanges, Fittings and Anchors: Provide brackets, flanges, fittings and anchors for the attachment of wall panels to other work.

2.05 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are not acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

D. Remove or blend tool and die marks and stretch lines into finish.

E. Grind and polish surfaces to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each panel.

F. Stainless Steel Finish: AISI No. 4 finish.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION, INSTALLATION/ERECTION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

B. Installation, General: Provide anchorage devices and fasteners necessary for fastening wall panel systems to in-place construction using manufacturer's standard connections. Coordinate and furnish anchorages, templates, setting drawings, instructions and recommendations for installation of items embedded in concrete or masonry construction.

C. Corrosion Protection: Coat concealed surfaces of aluminum with heavy coat of bituminous paint when aluminum surfaces will be in contact with grout, concrete, masonry, wood or dissimilar metals.

D. Adjust wall panels prior to anchoring to ensure matching alignments at abutting joints. Space panels at intervals indicated.

3.03 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
2. Allowable Variation from True Level: ± 1/8" in 20'-0"
3. Allowable Variation from True Line: ± 1/8" in 20'-0"

3.04 ADJUSTING, CLEANING, TOUCH-UP, AND PROTECTION

A. Touch-up damaged coatings and finishes to eliminate evidence of repair.

B. Repair minor damage to eliminate all evidence of repair. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM	DESCRIPTION	UNIT
0550.978	Stainless Steel Wall Panels	Lump Sum

- END OF SECTION -

SECTION 05710

METAL CEILING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the following:

1. Custom metal ceiling systems.
2. Custom metal platform canopies.
3. Standard lay-in acoustical metal panel ceilings at the South Lobby and Stair up to South Headhouse; and at Offices, and Toilet Rooms at the North End.
4. Back-up framing and attachment systems.
5. Custom miscellaneous aluminum shapes and trim pieces.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this section.

B. Other specifications sections that directly relate to work of this section include, but are not limited to:

1. Section 05500 - Miscellaneous Metals.
2. Section 05700 - Ornamental Metalwork.

1.03 QUALITY ASSURANCE

A. Installer: A firm which has experience in work of the type required by this section.

B. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

C. Mock-ups: Before beginning primary work of this section, provide mock-ups at locations acceptable to Engineer and obtain Engineer's acceptance of visual qualities for each type of wall and ceiling panel. Protect and maintain acceptable mock-ups throughout the work of this section to serve as criteria for acceptance of this work. Provide mock-ups as follows:

1. Provide one full bay. mock-up of each of the each ceiling type.

D. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts, to design and certify that the work of this section meets or exceeds the performance requirements specified in this section.

E. Shop Assembly: Preassemble all items specified as work of this section to the greatest extent possible to minimize field splicing. Disassemble units as required for shipping and handling. Clearly mark units for reassembling in the field.

1.04 PERFORMANCE REQUIREMENTS

A. Wind Uplift at Ceilings: Design and engineer custom metal ceilings, anchors and hangings to resist a 20 lb. positive and negative wind load.

B. Design, fabricate, and install all work of this Section so that completed work will withstand its own dead loads, plus loading contributed by lighting fixtures, sprinklers, and other items supported by the ceiling and wall systems, all while maintaining the deflection criteria specified herein.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Provide shop drawings stamped and signed by a professional engineer licensed to practice in the Commonwealth of Massachusetts.

C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Allow for field cutting and fitting where taking field measurements before fabrication is not possible.

D. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Show how design load requirements and other performance criteria have been satisfied.

E. Samples: Submit representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected. Provide minimum 12" long samples of handrails, toprails, and posts. Provide samples of all exposed fittings and brackets.

F. Coordination Drawings: Submit a complete set of coordination drawings prepared by manufacturer and installer, showing extent of custom aluminum ceiling and wall work, showing coordination with mechanical and electrical trades. Show methods of anchoring to structures above.

1.06 QUALITY ASSURANCE

A. Verify all measurements and dimensions in the field prior to beginning shop and coordination drawings.

B. Coordinate layout and installation of work of this Section with other work supported by, penetrating through the ceiling and wall system, including light fixtures, HVAC equipment, conveying systems, fire suppression system components, and partitions.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver custom ceiling and wall panel work wrapped in manufacturer's standard protective coverings. Deliver brackets, fittings, fasteners and other miscellaneous materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 PROJECT CONDITIONS

A. Proceed with work only when substrate construction is complete.

1.09 SEQUENCING AND SCHEDULING

A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.10 MAINTENANCE SUPPLY

A. Deliver a quantity of materials, including panels, equal to 2% of the amount installed of the flat metal panel ceiling system, and two full segments of the curved metal panel ceiling system.

PART 2 - PRODUCTS

2.01 ALUMINUM MATERIALS AND PRODUCTS FOR CUSTOM CEILING SYSTEMS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required:

1. Extruded Bars and Shapes: ASTM B 221 (ASTM B 221M), 6063-T6.
2. Extruded Pipe and Tubes: ASTM B 429, 6063-T6.
3. Drawn Seamless Tubes: ASTM B 483 (ASTM B 483M), 6063-T832.
4. Plate and Sheet: ASTM B 209 (ASTM B 209M), 6061-T6.
5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), 6061-T6.
6. Castings: ASTM B 26/B 26M, A356-T6.
7. Perforated Sheet: ASTM B 209 (ASTM B 209M), 6061-T6, minimum 0.040 in. thick, with perforations 3/8 in. diameter on 7/8 in. centers, or if not indicated, as selected by Engineer.
8. Non-Perforated Sheet: ASTM B 209 (ASTM B 209M), 6061-T6, minimum 0.040 in. thick.

B. Fabricators of Custom Work: Work of this Section shall be provided by a manufacturer/fabricator with prior experience in the type of work specified and indicated on Drawings. Work shall be done by a single-source manufacturer, taking full responsibility for engineering, design, fabrication, and installation of all work of this

Section. Provide complete custom aluminum ceiling systems.

C. Metal Support System - General: Provide custom, integrated system that combines slotted metal channel struts, fittings, fasteners, and anchors.

1. Slotted Channel Struts: Slotted channels complying with fabricated from extruded aluminum.
2. Fittings and Fasteners: System manufacturer's standard components of design, size, and material required to attach securely struts to building structure, by method indicated or selected, and metal panel attachments to struts, as well as to prevent galvanic corrosion. Provide custom fabricated system matching details on Drawings.

D. Miscellaneous Materials And Products:

1. Non-Shrink, Non-Metallic Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C621.

2. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended for color match, strength and compatibility in the fabricated items.

3. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as metal being fastened, unless otherwise indicated.

   a. Concealed Fasteners: Provide concealed fasteners for the interconnection of components, and for all other connections, except where exposed fasteners are indicated or unavoidable.
   b. Exposed Fasteners: Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

4. Anchors and Inserts: Furnish inserts and anchors to be set in concrete or masonry, of proper type, size and material for loading conditions indicated. Where anchors are drilled into concrete, provide epoxy adhesives.

   a. Provide units with exposed surfaces finished to match finish and texture of the metal being anchored.

5. Bituminous Paint: SSPC-Paint (Cold-applied asphaltic mastic).

6. Acoustical Insulation at Ceilings: Provide manufacturer's standard 2 in. thick 1 lb. density, non-dusting fine fibered, fibrous glass. Insulation shall be encapsulated with manufacturers standard CLASS A rated PVC, color to be non-gloss black. Secure insulation to backside of metal ceiling panels to prevent dislodgment.

E. Fabrication: Fabricate work to design, dimensions and details shown. Provide members in sizes and profiles indicated, with supports, anchors, and brackets of size and spacings shown.

1. All shapes and trim pieces shall be extruded aluminum.

2. Fabricate work to be truly straight, plumb, level and square.

3. Brackets, Flanges, Fittings and Anchors: Provide brackets, flanges, fittings and anchors for the interconnection of components to other work as indicated.

4. Work Exposed To View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after finishing.

5. Welded Connections: Perform welding to comply with AWS for recommended practices, using method appropriate for metal and finish indicated. Provide continuous welds. Grind exposed welds flush and smooth to blend with adjoining finish metal surfaces.

6. Curves: Form simple and compound curves in solid members by casting members to shapes and profiles indicated. Provide curves and bends in sheet and hollow members by bending members in jigs designed to produce uniform curvature with uniform profile of member throughout entire bend without buckling, twisting or deforming in any way.

7. Close exposed ends of all members using manufacturer's custom fittings.

8. Provide fabricator's recommended neoprene gaskets or washers at areas where dissimilar metals contact each other. Provide all bolts, fasteners, screws, etc. insulated with dielectric washers and sleeves.

G. Finishes: Provide finishes for the custom metal ceiling systems as follows:

1. Baked-Enamel Finish for Soffit Running Down the Center of the Platform: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.

   a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils, medium gloss.
   b. Color: Cobalt Blue as approved by Engineer.

2. Anodized Finish for the curved and the Perforated Panels: Provide an anodized satin finish, silver in color, similar to Sateen Anodized, Sterling Anodized, or Grau Finish; as manufactured by CeilingsPlus, or approved equal.

2.02 STANDARD ACOUSTICAL METAL LAY-IN CEILING SYSTEM

A. Manufacturers: Provide acoustical m,etal lay-in ceiling system as manufactured by one of the following, manufacturers, or approved equal;

1. Chicago Mettalic Corp.
2. Armstrong World Industries.

CeilingsPlus

B. Product: Provide product eqial to Planostile Lay-In Metal Tile Ceiling System manufactured by Chicago Metallic, or approved equal as manufactured by Armstrong World Industries; Ceilings Plus; or approved equal.

C. Metal Tiles and Accessories

1. Tiles shall measure 2ft. x 2 ft. with flat lay-in edge detail.
2. Tiles formed from 0.032 in. aluminum perforated with a custom pattern, to provide 3/8 in. diameter holes at 7/8 in. centers.
3. Insulation: Poly-encased insulation pads, of1-1/2 thickness and a density of 1-1/2 pcf, shall be provided for sound absorption capabilities.
4. Tile Inlay: Type II - Dustguard sheet to be inserted in the factory and adhered with glue to the back of the tile for the reduction of air and dust penetration through the perforations.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION, INSTALLATION/ERECTION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

B. Installation, General: Provide anchorage devices and fasteners necessary for fastening handrail and railing systems to in-place construction using manufacturer's standard connections. Coordinate and furnish anchorages, templates, setting drawings, instructions and recommendations for installation of items embedded in concrete or masonry construction.

C. Corrosion Protection: Coat concealed surfaces of aluminum with heavy coat of bituminous paint when aluminum surfaces will be in contact with grout, concrete, masonry, wood or dissimilar metals.

D. Adjust work prior to anchoring to ensure matching alignments at abutting joints. Space anchoring at intervals indicated, or as required by design loading, whichever dimension is less.

3.03 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
2. Allowable Variation from True Level: ± 1/8" in 20'-0"
3. Allowable Variation from True Line: ± 1/8" in 20'-0"

3.04 ADJUSTING, CLEANING, TOUCH-UP, AND PROTECTION

A. Touch-up damaged coatings and finishes to eliminate evidence of repair.

B. Repair minor damage to eliminate all evidence of repair. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0922.000	Metal Ceiling	Lump Sum

- END OF SECTION -

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing rough carpentry as indicated on Drawings and as specified herein, including, but is not limited to, the following:

1. Concealed blocking, grounds and nailers.
2. Wood benches.
3. Wood shelving at Janitor's closet.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:

1. Section 05500 - Miscellaneous Metals.

1.03 INTENT

A. A major intent of the work of this section is to provide concealed blocking, grounds, and nailers for all work in this project, including wood benches.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Treatment Data: For each type of treatment required provide manufacturer's certification stating chemicals and process used, quantities of chemicals retained, conformance with applicable standards, and certification that moisture content after treatment was reduced to maximum specified.

1.05 STORAGE AND HANDLING

A. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from moisture and damage. Stack materials to promote air circulation.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.06 PROJECT CONDITIONS

A. Coordinate work of this section with work of other sections to ensure proper location and attachment of other work. Scribe and trim work to provide accurate fit.

1.07 QUALITY ASSURANCE

A. Mock-Ups: Prior to commencing the primary work of this Section, provide mock-ups of work as indicated below. Obtain Engineer's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this Section to serve as criteria for acceptance of the work.

1. Mock-up of one bench.

PART 2 - PRODUCTS

2.01 BLOCKING LUMBER

A. Lumber For Blocking: Provide construction grade boards or no. 2 boards of any species complying with PS 20. Provide above ground lumber in contact with roofing sheet metal, concrete, etc. that is pressure treated with waterborne preservatives complying with AWPB LP-2 and AWPA C2. Dry lumber to maximum moisture content of 19% after treatment.

2.02 BENCHES

A. Wood Species and Cuts: Provide as follows:

1. Provide fresh-cut (approximately 40% moisture content) untreated Ipe.

B. All hardwood material shall be free from "white rot" and other deformities. Members shall be cut without bark, wane, or sapwood. Intermediate light-colored heartwood shall be permitted. Well-boxed and sound heart shall be permitted in members 10 in. x 10 in. and larger.

C. Members shall be straight-grained (maximum slope to grain 1:10) and without knots or excessive bending or twisting.

D. Members shall be full-cut to actual (not nominal) dimensions with a tolerance of ±3/16" unless otherwise indicated.

E. Members shall be provided overlength.

F. Small drying splits, cracks, or seasoning checks which do not impair the fastening or strength of the material shall be permitted, as approved by the Engineer.

G. Ipe shall be naturally resistant to decay, insects, vandals, and fire without the use of chemical preservatives or treatments.

2.03 FASTENERS

A. Provide size, type, and material appropriate for intended use. For sheathing and where used in areas of high humidity, provide fasteners with ASTM A153 hot-dip galvanized coating.

2.05 SHELVING

A. Scope: Shelving work includes, but is not limited to, the following:

1. Painted shelving at Janitor's closet.

B. Shelving: Provide as follows:

1. Painted Shelves: Provide hardwood veneered plywood with hardwood "V" edge band.

C. Framing and Cleats: Provide painted hardwood frames and cleats.

D. Quantity: Provide minimum of 5 shelves, spaced evenly from top to bottom.

E. Shelf Deflection: Design and brace shelves to limit deflection to 1/4 in. maximum when loaded to 50 pounds per square foot for shelves.

PART 3 - EXECUTION

3.01 INSTALLATION/ERECTION

A. Strictly comply with referenced standards, except where more restrictive requirements are specified in this section. Choose pieces carefully to eliminate split, warped and twisted members.

B. Securely anchor work to substrates and structure. Ensure that blocking is capable of supporting applied work and loadings. Countersink bolts and other fasteners flush with face of wood.

C. Saturate cut ends of treated wood with same chemicals used for original treatment.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0610.000	Rough Carpentry	LS

END OF SECTION

SECTION 07101

WATERPROOFING AND DAMPPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies general requirements applicable to waterproofing and dampproofing work, in accordance with Standard Specifications Section 07101, except as modified herein.

B. Additional requirements for specific types of waterproofing are set forth in the following section:

1. 07110, Sheet Membrane Waterproofing.

PART 2 – PRODUCTS

Under Subsection 2.01B., add Subparagraph 2 as follows:

2. For section 07110:

a. Hardboard: FS LLL-B-810, Type II; or

b. Insulation Board: Asphalt-impregnated fiber board, not less than 1/8 inch thick.

PART 4 – MEASUREMENT AND PAYMENT

Under Subsection 4.01., revise paragraph B to read as follows:

B. Permanent protection courses will not be separately measured for payment, but will be considered incidental to waterproofing system to which it pertains.

Under Subsection 4.02., revise paragraph B to read as follows:

B. Permanent protection course will be paid for under the specific waterproofing system that it pertains to. No separate payment will be made, it shall be considered incidental to the waterproofing system.

-END OF SECTION-

SECTION 07110

SHEET MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section specifies sheet membrane waterproofing and associated products at locations as indicated on Drawings.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 03300, CAST-IN-PLACE CONCRETE.
2. Section 07101, WATERPROOFING AND DAMPPROOFING
3. Section 07600, FLASHING AND SHEET METAL WORK
4. Section 07920, SEALANTS AND CAULKING

1.03 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

1. American Society for Testing and Materials (ASTM):

D 146 Felted and Woven Fabrics Saturated with Bituminous Substances for Use in Waterproofing and Roofing

D 147 Bituminous Mastics, Grouts and Like Mixtures

D 412 Standard Test Methods for Rubber Properties in Tension

D 570 Standard Test Method for Water Absorption of Plastics

D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds

D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)

D 3767 Standard Practice for Rubber - Measurements of Dimensions

D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes

E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

1.04 SUBMITTALS

A. Product Data for each type of waterproofing specified, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of the waterproofing system.

B. Shop Drawings showing locations and extent of waterproofing, including details for substrate joints and cracks, sheet flashings, penetrations, tie-ins with adjoining construction, and other termination conditions.

C. Samples, 3-by-6 in. minimum size, of each waterproofing material required for Project.

D. Installer certificates signed by manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article.

E. Product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is certified in writing by waterproofing manufacturer as qualified to install manufacturer's waterproofing.

B. Single-Source Responsibility: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing waterproofing.

C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing. See Section 3.01B.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
2. Protect primer, mastic and adhesive from moisture and potential sources of ignition.
3. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.

1.07 PROJECT CONDITIONS

A. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

B. Do not apply waterproofing in snow, rain, fog, or mist.

C. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

D. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.08 WARRANTY

A. Special Warranty: Submit a written warranty signed by waterproofing manufacturer and Installer agreeing to repair or replace waterproofing that does not meet requirements or that does not remain watertight during the specified warranty period. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 in. in width.

1. Warranty Period: 5 years after date of Substantial Completion.

1.09 PROTECTION

A. Protect the building and finish surfaces from damage, resulting from spillage, dripping, and dropping of materials. Prevent materials from entering and clogging drains. Repair, restore or replace work which is soiled or damaged in connection with the performance of the work.

PART 2 - PRODUCTS

2.01 SHEET WATERPROOFING

A. Acceptable Products: Provide one of the following products that meet or exceed specified requirements, or approved equal:

1. Bituthene 3000/4000; W.R. Grace and Co.
2. Duremem 700-SM; Pecora Corp.
3. Mel-Rol; W.R. Meadows, Inc.
4. Miradri 860/861; TC Miradri

B. Performance Requirements: Provide self-adhering sheet membrane waterproofing of rubberized asphalt or butyl integrally bonded to polyethylene sheeting, and having the following minimum features and characteristics:

Property	Test Method	Value
Thickness	ASTM D 3767 Method A	0.056 in.
Tensile Strength, Membrane Die C modified	ASTM D 412	250 lbs/in.^{2} minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D 412	300% minimum
Pliability Temperature	ASTM D 146	-25°F
Lap Adhesion at Minimum Application Temperature	ASTM D 1876 Modified[1]	4 lbs/in. minimum
Peel Strength	ASTM D 903 Modified[2]	9 lbs/in. minimum
Puncture Resistance, Membrane	ASTM E 154	50 lbs minimum
Resistance to Hydrostatic Head	ASTM D 5385	150 ft of water
Water Absorption	ASTM D 570	0.5% maximum

Footnotes:

1. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
2. The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

2.02 MISCELLANEOUS MATERIALS

A. Prefabricated Drainage Panels: Three-dimensional, high-impact resistant polymeric grid with a woven monofilament drainage fabric bonded to the grid. Polymeric grid shall have a minimum compressive strength of 15,000 psf per ASTM D 1621 and a minimum flow (Q) of 1/34 gpm/ft of width at 3,600 psf sustained for 300 hours, and hydraulic gradient of 0.01 (ASTM D 4716); filter fabric shall have a permeability coefficient of 0.015 cm/sec; such as Miradrain 6200 by Mirafi, Inc. or approved equal.

B. Primer, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

2.03 RIGID INSULATION

A. Rigid Foam Extruded Insulation: Provide rigid, closed-cell, extruded polystyrene complying with ASTM C 578, and the following properties and characteristics:

1. k-Value: 0.20 maximum aged value at 75°F. mean temperature.
2. R-Value: 4 per 1 inch of thickness
3. Compressive Strength: 60 psi .
4. Normal density: 1.0 lb/ft^3
5. Water Absorption: Less than 0.2% by volume.
6. Water Vapor Permeability: Maximum 1.0 perm-inch.

B. Thickness: As indicated on Drawings. Provide insulation in single layer in thickness indicated, from one of the following manufacturers, or equal:

1. Styrofoam - Dow Chemical Company
2. Foamular - U C Industries, Parsippany, NJ
3. Amofoam - Amoco Foam Products Company

C. Adhesive for Rigid Foam Insulation: Non-Etch Foam Adhesive by Continental Chemical & Coatings Corp., Woburn, MA, Mastic No. 11 by Dow Chemical Company, Contech PL300 Foam Board Adhesive, or equal and as maintain compatibility with sheet membrane waterproofing.

PART 3 - EXECUTION

3.01 CONDITION OF SURFACE

A. Examine substrates, adjoining construction and condition under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

B. Pre-Installation Meeting: Prior to installation of waterproofing and at the Architect's direction, meet at Project site to review material selections, installation procedures, and coordination of Work with other trades. Meeting shall include Architect's Project Representative, Trade Contractor, Subcontractor, manufacturer's representatives, inspection and testing services (if any), and any other subcontractor whose work requires coordination with this work.

C. Surfaces to receive waterproofing shall be thoroughly dry and free of moisture. Concrete shall have cured a minimum of 28 days before application of waterproofing.

D. Concrete surfaces to receive waterproofing shall be clean, free of projections, sharp corners, voids, surface laitance, loose aggregate, form release agents, curing compounds, and other surface treatments.

E. Surfaces shall not contain any grease, oil, or any other contaminants which could affect the complete bonding of waterproofing membrane to concrete surface.

3.02 WATERPROOFING INSTALLATION

A. Install and complete waterproofing membrane system, sealing edges and seams and forming corners to assure that no water leakage through membrane occurs.

B. Install system in accordance with manufacturer's instructions, except where more stringent requirements are specified.

C. Provide flashing materials at expansion joints, control joints, cracks and penetrations as required and with such materials and designs as recommended by manufacturer of sheet membrane waterproofing system.

D. Fill non-moving cracks, joints, and form tie rod holes with sealant or other compounds as recommended by waterproofing materials manufacturer for compatibility with waterproofing.

E. Prime and seal concrete as recommended by membrane manufacturer. Use products and methods recommended by waterproofing materials manufacturer.

F. Install cant strips where shown or recommended by waterproofing materials manufacturer.

G. Apply sheet membrane waterproofing to a total thickness indicated, utilizing methods recommended by waterproofing materials manufacturer. Correct deficient areas by procedures recommended by materials manufacturer.

H. Seal daily terminations with troweled bead of mastic.

3.03 INSULATION INSTALLATION

A. Install one layer of board insulation to required thickness over waterproofed surfaces. Cut and fit to within 3/4 in. of projections and penetrations.

B. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.

3.04 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels over insulation according to manufacturer's written instructions. Use adhesives or mechanical fasteners that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. Install board insulation before installing drainage panels.

3.05 CLEAN-UP

A. Upon completion of the system, clean all stains, remove all masking, protections, equipment, material, and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM	DESCRIPTION	UNIT
0711.005	Sheet-Applied Membrane Waterproofing	Lump Sum

END OF SECTION

SECTION 07120

FLUID APPLIED WATERPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing hot and cold fluid applied waterproofing as noted on the Contract Drawings and in accordance with Standard Specifications Section 07120 without modification.

PART 4 – MEASUREMENT AND PAYMENT

4.01 GENERAL.

No separate measurement nor payment will be made for work required under this Section. All costs in connection therewith shall be incidental to Sheet-Applied Membrane Waterproofing.

END OF SECTION

SECTION 07162

CRYSTALLINE WATERPROOFING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. This Section specifies crystalline waterproofing and associated products at locations as indicated on the Contract Documents.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 03300, CAST-IN-PLACE CONCRETE.
2. Section 03610, CONCRETE CRACK SEALING WITH INJECTED WATER-REACTIVE POLYURETHANE
3. Section 03740, STRUCTURAL CRACK REPAIR BY EPOXY INJECTION
2. Section 07101, WATERPROOFING AND DAMPPROOFING
3. Section 07600, FLASHING AND SHEET METAL WORK
4. Section 07920, SEALANTS AND CAULKING

1.03 SUBMITTALS

A. Product Data: Include material descriptions and installation instructions for crystalline waterproofing.

B. Product Certificates: For crystalline waterproofing, signed by product manufacturer.

C. Qualification Data: For Installer and manufacturer.

D. Material Test Reports: For crystalline waterproofing.

E. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Mockups: Provide mockups of crystalline waterproofing to verify selections made under sample submittals and to demonstrate aesthetic effects.

1. Architect will select locations of mockups that represent typical surfaces and conditions for applications of crystalline waterproofing.
   a. Vertical and horizontal surfaces: Provide samples of at least 10 sq. ft.
2. Apply waterproofing according to requirements for the completed Work after permanent lighting and other environmental services have been activated.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to crystalline waterproofing including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review required certifying procedures.

1.05 PROJECT CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions and warranty requirements.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete and masonry substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F or above during work and cure period, and space is well ventilated and kept free of water.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of crystalline waterproofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure to maintain watertight conditions within specified warranty period.
2. Warranty Period: five years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. Crystalline Waterproofing:
   a. American Permaquik Inc.; Super 200.
   b. Anti-Hydro International, Inc.; Hydro Cap.
   c. AQUAFIN, Inc.; Aquafin-1C.
   d. Conproco Corp.; Super Seal.

e. Gemite Products, Inc.; Cem-Kote CW Plus.
f. ICS Penetron International Ltd.; Penetron Addmix.
g. IPA Systems, Inc.; Drycon.
h. Specon, Incorporated; Hydrocel (HCPM).
i. Tamms Industries, Inc.; Hey'Di K-11.
j. ThoRoc, Div. of ChemRex; Tegraproof.
k. Vandex International Ltd.; Vandex Super.
l. Xypex Chemical Corporation; Xypex.

2. Plugging and Patching for Leak Repair: Refer to Sections 03610 and 03740.

2.02 MATERIALS

A. Crystalline Waterproofing: A prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates by capillary action into concrete or masonry and reacts chemically with free lime in the presence of water to develop crystalline growth within concrete or masonry capillaries to produce an impervious, dense, waterproof concrete or masonry with properties meeting or exceeding the following criteria:

1. Permeability: 0 for water at 33 feet when tested according to CE CRD-C 48.
2. Compressive Strength: 3000 psi when tested according to ASTM C 109/C 109M.

B. Patching and Plugging Compounds: Refer to Sections 03610 and 03740.

C. Water: Potable.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Acceptance of Conditions: Examine substrates, with Applicator present, where waterproofing is to be applied.

1. Proceed with application only after unsatisfactory conditions have been corrected.
2. Notify Architect in writing of active leaks or structural defects that would affect system performance.

3.02 PREPARATION

A. Protect other work from damage from cleaning, preparation, and application of crystalline waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Stop active water leaks according to waterproofing manufacturer's written instructions.

C. Repair damaged or unsatisfactory concrete or masonry according to manufacturer's written instructions.

D. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, curing compounds, and form-release agents to ensure that waterproofing bonds to concrete or masonry surfaces.

1. Clean masonry surfaces according to ASTM D 4261.

   a. Lightweight Concrete Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
   b. Medium- and Normal-Weight Concrete Masonry: Sandblast or bushhammer to a depth of 1/16 inch.

2. Clean concrete surfaces according to ASTM D 4258.

   a. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.

3. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.03 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions for application.

1. Dampen surface for several hours prior to application with water and maintain damp condition until applying waterproofing.
2. Apply waterproofing to negative-side surfaces.
3. Number of Coats: [One] [Two] for [brush] [spray] application.
4. Dampen surface between coats.

B. Final Coat Finish: [Smooth] [Spray Textured] [Brushed].

C. Moist-cure waterproofing for three days immediately after application has set, followed by two days of air drying as recommended in writing by manufacturer.

D. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:

1. On to columns integral with treated walls.

3.04 PROTECTION

A. Protect applied crystalline waterproofing from rapid drying, severe weather exposure, and water accumulation. Maintain completed Work in moist condition for not less than three days by procedures recommended in writing by waterproofing manufacturer. Protect waterproofing from temperatures below 36 deg F.

3.05 FIELD QUALITY CONTROL

A. Inspection: Manufacturer's representative to inspect completed application and to provide a written report that application complies with manufacturer's written instructions.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for Waterproof and Dampproof – Substation and as indicated herein.

Item	Description	Unit
0716.005	Waterproof and Dampproof - Substation	Lump Sum

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing building insulation work in accordance with Standard Specification Construction Section 07210, except as modified herein.

C. Types of insulation specified herein, include the following:

1. Rigid extruded polystyrene insulation.
2. Other building insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.

1.05 JOB CONDITIONS

B. Fire Performance: Provide products that meet or exceed flammability ratings indicated or required by authorities having jurisdiction.

C. Thickness: Where R values are indicated, provide thicknesses of insulation materials required to achieve value specified.

1.06 RELATED WORK

A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:

1. Section 05710, CUSTOM METAL CEILING SYSTEM; Acoustic insulation above ceiling.
2. Division 15 - MECHANICAL; Pipe and duct insulation.

PART 2 PRODUCTS

2.01 MATERIALS

C. Rigid Insulation

1. Rigid Polystyrene Insulation - Horizontal Application: Provide extruded polystyrene insulation, minimum 60 lbs. per sq. in. compressive strength, water vapor transmission of 1.0 perm, and water absorption by volume of 0.1%. Provide boards with manufacturer's standard tongue and groove edges. Provide product from one of the following manufacturers, or Engineer approved equal:

   a. Amoco Foam Products Company.
   b. Dow Chemical Co.

c. UC Industries, Inc.

2. Rigid Polystyrene Insulation - Vertical Application: Rigid insulation for vertical locations shall be indicated thickness(es) of extruded, closed-cell polystyrene insulation, with density of 2.1 lbs. per cu. ft., thermal conductivity (K) of 0.20 at 75°. and 0.185 at 0°F., compressive strength of 25 psi at 10% deformation, coefficient of linear thermal, expansion of 3.5 x 10-5, water absorption of 0.1% by volume, and a perm-rating of 1.0 perm-in. maximum, in accordance with appropriate ASTM tests.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
07220.000	Building Insulation	Lump Sum

- END OF SECTION -

SECTION 07270

FIRESTOPPING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies firestopping as required to prevent the passage of flame and the products of combustion through concealed spaces and openings, including, but not limited to, the following:

1. At concrete floor plugs.
2. Between stories, unless within a fire-rated shaft.
3. Above wall or partitions indicated to extend to underside of structure above.
4. Concealed furring spaces behind finished surfaces.
5. Locations at pipes, conduits, ducts and other construction which passes through fire rated assemblies.
6. Openings related to fire-extinguisher cabinets, recessed water coolers, mechanical and electrical panels, and all other systems that penetrate or interrupt fire-rated assemblies.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

1.03 INTENT

A. The extent and intent of firestopping work is described in Section 919 of the Commonwealth of Massachusetts, State Building Code.

1.04 QUALITY ASSURANCE

A. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

1.05 TESTS

A. Fire-Resistance: Provide materials and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119, UL 263, ANSI A2.1, or NFPA 251 by independent agencies acceptable to the Engineer and authorities having jurisdiction.

B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E84 are as follows:

1. Flame Spread: Not more than 25.
2. Smoke Developed: Not more than 25.

1.06 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Test Reports: Submit manufacturers' certified test reports and general certification that products meet requirements.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 SEQUENCING AND SCHEDULING

A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

B. Perform work of this section and other sections in proper sequence so that this work will not be damaged and will be installed prior to installation of enclosing or concealing work.

C. Install firestopping work as soon as practical.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Safing Insulation: Provide material tested, listed and labeled by UL and listed by UL in designs similar to applications indicated. Provide semi-rigid, non-asbestos mineral fiberboard, rated noncombustible when tested according to ASTM E136, complying with FS HH-I-558B form A, and having the following characteristics:

1. K-Value: 0.25 at 75oF.

2. Thickness: 4", unless indicated otherwise, and not less than the thickness necessary to obtain required fire-rating.

3. Density: Nominal 4 lbs./ft3.

4. Acceptable Product: Thermafiber Safing Insulation, U.S. Gypsum Co.

B. Mineral Wool: Loose mineral wool, rated noncombustible when tested according to ASTM E136, free of asbestos and glass fiber, and suitable for stuffing into metal deck flutes to an in-place density of 6 to 12 lbs./ft3.

C. Caulk and Putty: Provide 3M Fire-Barrier Caulk and Putty, Nelson Electric Co. Flame Seal Putty, and Dow Corning Silicone RTV Foam, or approved equal.

D. Accessories: Provide anchorage accessories complying with UL designs and other components and accessories as needed.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION

A. Review extent and types of required firestopping with governing authorities before beginning work. Obtain approval of thicknesses and installation methods, including non-typical locations.

3.03 INSTALLATION

A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this section.

B. Provide firestopping material and thickness as required to provide indicated ratings. Where not otherwise indicated, comply with UL standard designs. In multiple layer work, offset joints by at least 6".

C. Anchor firestopping using manufacturers' recommended system and in compliance with UL standard designs.

D. Install firestopping without gaps and voids of any kind. Do not used damaged materials. Remove and replace nonfitting or disturbed work.

3.04 FIELD QUALITY CONTROL

A. Coordinate installation of firestopping work with other work to minimize cutting and removal of installed fireproofing. As work of other trades is completed, review firestopping work and repair or replace work which has been damaged or removed.

3.05 PROTECTION

A. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and rework as necessary immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 **GENERAL** No separate measurement or payment will not be made for work required under this Section. All costs in connection therewith will be considered incidental to the item of work to which it pertains.

- END OF SECTION -

SECTION 07530

MEMBRANE ROOFING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installation of a fully adhered PVC single ply membrane roofing system including wood blocking, fascia edge components, fasteners, adhesives, flashing, and other associated accessories.

B. The work of this section includes, but is not limited to, furnishing and installation of the following:

1. Fully adhered reinforced fleece back single ply membrane system.
2. Roofing flashings, fascia edge and wood nailers.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.

B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:

1. Section 02050 - Demolition; removal of sections of existing roof structure.
2. Section 03300 - Cast in Place Concrete; new roof structure.
3. Section 06100 - Rough Carpentry; wood nailers.
4. Section 07920 - Sealants and Caulkings; sealants required at roof system.

1.03 QUALITY ASSURANCE

A. Installer: Roofing system shall be applied by an approved contractor authorized by roof membrane manufacturer.

B. Pre-Installation Conference: A site meeting shall be held with representatives of the Contractor, Engineer, Roofing and Flashing Contractor and Roofing Materials Manufacturers (3) three days prior to the start of roofing work to inspect substrata and review installation requirements.

C. Upon completion of the installation, and at appropriate intervals during installation, an inspection shall be made by a representative of the manufacturer to ascertain that the roofing system has been installed according to applicable manufacturer's specifications and details.

1.04 SUBMITTALS

A. Certificates:

1. Submit evidence of acceptance of roof applicator by roofing manufacturer.

2. Written certification (in time to prevent delay in work) by the producer of roofing and insulation materials that all materials supplied comply with all requirements of the appropriate ASTM Standards, and that all the materials are suitable for the specified roofing system(s).

B. Samples and Shop Drawings:

1. Samples, in duplicate, of all materials specified, each properly labeled.

2. Shop Drawings:

a. Metal flashing, showing exact profile, lengths, joints, terminations and methods of attachment.

b. Membrane and elastomeric flashing details.

c. Complete layout of wood nailers.

C. Manufacturer's Literature: Latest edition of acceptable manufacturer's roofing and base flashing specifications selected.

D. Warranties: Copy of membrane manufacturer's warranty. Copy of applicators warranty.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

B. Handle all materials to avoid damage. Store rolled goods as directed by manufacturer. Discard rolls which have been flattened, creased, or otherwise damaged. Bonding adhesive shall be stored at temperatures above 40°F.

C. Do not dilute primers, roofing cements, coatings or sealants. Keep containers closed except when removing materials from them.

D. Do not allow materials or incomplete roofing work to be exposed to moisture, anywhere, at any time, during transportation, storage, handling or installation. Use pallets and canvas tarpaulins (not polyethylene) to cover all stored material, top to bottom.

1.06 PROJECT CONDITIONS

A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Only as much of the new roofing as can be made weather-tight each day including all flashing work, shall be installed.

C. All surfaces to receive new insulation, membrane or flashings shall be thoroughly dry. Should surface moisture occur, the contractor shall provide the necessary equipment to dry the surface prior to application.

D. Temporary water stops shall be installed at the end of each days work, and shall be removed before proceeding with the next day's work. Waterstops shall be compatible with all materials and shall not emit dangerous or incompatible fumes. Provide waterstops for all roofing systems described in this specification per manufacturers recommendations.

E. The contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Plywood protection shall be provided for all new roofing areas which will receive traffic during construction.

F. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming or sweeping. Blowing with compressed air is not acceptable.

G. Membranes and accessories shall not be exposed to prolonged temperature in excess of 160° F.

H. Contaminants, such as grease, fats, oils and solvents, shall not be allowed to come into direct contact with the roofing membrane. Any unusual exposures shall be presented to the membrane manufacturer for assessment of any impact on the roofing membrane.

1.07 WARRANTY

A. Roofing systems shall be warranted to the Authority by Roofing System Supplier for a period of ten years from date of final acceptance as follows:

1. The Roofing System Supplier will repair any leaks in the system caused by defects in the materials supplied or in the workmanship of the Supplier's Authorized Roofing Applicator.

2. The Roofing System Supplier will provide a material warranty which shall protect the Authority against any cost of repairing leakage which results from defect in the membrane.

B. The Contractor, as a condition precedent to final payment, shall execute his own written guarantee direct to the Authority, warranting all roofing, base flashing and sheet metal work weather and water tight and perfect for a period of two years from the date of final acceptance of the Project. Any imperfections as a whole or in part, by reason of defective materials, workmanship or arrangement of the various parts shall be made good to the satisfaction of the Authority at the Contractor's expense.

PART 2 - PRODUCTS

2.01 FULLY ADHERED MEMBRANE SYSTEM

A. Membrane: In order to set a level of quality, the membrane system shall be based on 60 mil thick felt back PVC membrane, G410 FB, non-woven fiberglass reinforced sheet membrane with acrylic coating applied to top of membrane and felt backing fused with heat to the back of the membrane as manufactured by Sarnafil, Incorporated. Acceptable alternate would be 0.045 inch thick ethylene interpolymer (EIP) alloy, reinforced with knitted polyester fabric, FiberTite-XT with felt backing as manufactured by Seaman Corporation or Architect approved substitute which conforms to the following physical properties:

1. Product Code No. G410 FB: Membrane shall conform to ASTM D4434-85 Standard for (poly vinyl chloride) sheet roofing, Class Type II, Grade I.

Parameters	ASTM Test Method	Typical Physical Properties
a. Color		Color to be chosen by Engineer from manufacturer's standard colors.
b. Tensile strength, minimum	D638	1600 psi
c. Elongation at break, minimum	D638	270% M.D.
d. Seam strength % of Tensile	D638	80%
e. Overall thickness	D638	.060 inches
f. Linear dimensional change	D1204	0.02%
g. Vapor permeability	E96A	0.004 perm inch
h. UV resistance	D2565 Xenon	10,000 hours, no cracks
I. Tearing Resistance	D1004	14 lbf min.
j. Low Temperature Bend	D2136	Pass
k. Weight change after immersion in water	D570	2.5% (w/o felt)
l. Static Puncture Resistance 33lbf	D5602	Pass
m. Dynamic Puncture Resistance 7.3 ft-lb	D5635	Pass

B. Flashing Adhesives and Sealants:

1. Adhesives: Manufacturer's recommended contact adhesive for concrete substrates encountered on this job. Application rates shall be in compliance with manufacturer's recommendations for intended substrate.

2. Sealant: As recommended by membrane manufacturer, color to match membrane.

C. Elastomeric Flashing:

1. Base flashing shall be compatible with sheet membrane as supplied by membrane manufacturer.

2. Pipe seals and prefabricated flashing accessories shall be as supplied by membrane manufacturer.

D. Prepunched Bar Fastener: 14 gauge galvanized U-shaped steel bar with rolled edges and slotted holes punched 1 inch on center for membrane securement at bases of walls and curbs and as perimeter clamping bar for adhered roof assemblies.

E. Accessory Products: The following products may be incorporated in this specification as needed or detailed on the drawings.

1. Metal Clad Flashing: G-410L, 0.20" thick laminated to 25 gauge galvanized sheet steel.

2. Membrane welder: Automatic hot air welding apparatus for seaming of sheets.

3. Termination Bar: 16 gauge flat galvanized bar pre-punched every 12" on center used for wind uplift resistance at base flashing.

F. Metal Flashing:

1. Preformed Fascia/Gravel Stop: Preformed, prefabricated, prefinished perimeter edge attachment and fascia assembly, Edge-Tite as manufactured by Sarnafil Incorporated or Architect approved substitute by Hickman Construction Products, MM Systems Corporation or Metal-Era. Finish shall be custom color Kynar 500 as selected by Architect.

   a. Edge-Tite shall be made from 3 distinct parts. The (base) rail shall be made from 0.050 thick type 5052-H32 mill finished alloy aluminum in 12'-0" length. The spring clips shall be 6" wide and made of 0.020" stainless steel. The snap fascia shall be made of 0.040 in. aluminum in 12'-0" lengths. The Edge-Tite fascia height shall be as indicated on drawings.

2. Reglets: Reglet shall be roofing manufacturer's surface applied counterflashing that optimizes caulk/sealant performance and clamping action. The reglet shall be made of 6063T5 extruded aluminum and be provided with predrilled holes at 8" on center for attachment to walls. Holes shall be symmetrically offset from the ends and shall be slotted for thermal expansion and contraction. The reglet shall have a 2-1/4 inch deep profile and shall be provide in 10 ft. Lengths. The reglet shall be 0.10 inch to 0.12 inch in thickness and weigh 3 lbs per 10 foot length. The design of the reglet shall incorporate reinforcing ribs to clamp the membrane. A shelf shall be incorporated into the design to support the sealant bed. Accessories shall include prefabricated spice plates to cover joints between sections and prewelded 90 degree inside and outside corners.

G. Wood Blocking:

1. Wood blocking at roof perimeters and penetrations shall be in profiles and sizes as indicated or required using dressed No. 2 kiln or commercial dried Hem-Fir pressure treated with preservatives in compliance with Section 06100. Blocking shall be provided and installed at the perimeter of the entire roof and around other roof projections and penetrations. Thickness of nailers shall provide a consistent horizontal nailer and plumb base for perimeter edge system. Nailers shall be sloped as necessary to provide a level base for the perimeter edge treatment.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that the work of other trades which penetrates new and old roof decks has been completed, and that wood nailers have been installed at perimeter and at vents, etc.

B. Roof surfaces before laying membrane roofing shall be smooth, firm, dry and free from high spots, depressions, oil, grease, all loose and foreign material, ponded water, ice or snow, shall be broom cleaned and comply with all the requirements of the roof manufacturer.

C. Do not proceed with application of roofing until defects are corrected, and the surfaces have been approved by a representative of the membrane manufacturer.

3.02 INSTALLATION OF FULLY ADHERED ROOF SYSTEM

A. Membrane:

1. Over the properly prepared concrete surfaces, apply approved adhesive and membrane in strict accordance with membrane manufacturer's printed instructions. All sheets shall be overlapped a minimum of three inches or as required by welding techniques.

2. Appearance of adhered membrane is very important. Installer shall take steps to ensure that all membrane installation including seams, joints, accessories, and welding are of the highest standard, uniform in appearance providing roof surface with a monolithic appearance.

B. Hot Air Welding of Lap Areas: All welding, weather by hand or machine shall be in compliance with Manufacturer's written instructions.

1. Adjacent sheets shall be welded in accordance with manufacturer's written instructions. All side and end lap joints shall be hot air welded. Lap areas shall be a minimum of 4" wide when hand welding.

2. Welding equipment shall be provided by or approved by the membrane manufacturer. All mechanics intending to use equipment shall have successfully completed a course of instruction provided by a membrane manufacturer's representative prior to welding.

3. All surfaces to be welded shall be clean and dry. No adhesive shall be present within the lap areas.

C. Installation of Wood Blocking/Nailers:

1. Install all wood blocking/nailers required by field conditions and as indicated on the drawings. Blocking shall be installed using approved non-corrosive fasteners spaced to resist uplift requirements of 175 pounds per linear foot. All blocking to receive bolts and/or screws shall be counter bored to provide the nut or screw head slightly below the top of wood surface.

2. Refer to drawings for all conditions necessary to complete the work. In the absence of details, blocking shall be provided in accordance with field conditions as approved by the Architect and as recommended by the membrane manufacturer.

3. Provide all required expansion sleeves necessary for Architect approved securement of blocking.

D. Membrane Securement:

1. Securement shall be provided at the perimeter of each roof level, roof section, curb, etc. and at change where slope or combined slopes exceed 2" in one horizontal foot.

2. Metal fastening strips shall be mechanically fastened into the appropriate structural substrate and secured to roofing membrane.

E. Membrane Flashing: All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary membrane flashing shall be allowed without the prior written approval of the membrane manufacturer. Approval shall only be for specific locations on specific dates.

3.03 INSTALLATION OF METAL FLASHING

A. General Installation Requirements:

1. The roofs shall be flashed and counter flashed and made watertight at all edges and intersections of roof with vertical surfaces of any nature.

2. All aluminum flashing and sheet metal work shall be fabricated and placed in accordance with the best practices and applicable requirements and details of "SMACNA " Architectural Sheet Metal Manual and any additional requirements, as specified herein.

3. Generally, flashing and sheet metal work shall be in lengths not exceeding 10 feet and free from longitudinal joints. All flashing in contact with dissimilar metal shall be coated with asphalt paint. All joints in flashing shall be sealed with seam sealant and made watertight.. Expansion joints shall be formed by joining ends of sheets together with a 3 inch loose lock, filled with elastic cement. Expansion joints shall be installed every 30 feet in straight runs; straight runs less than 30 feet shall have similar expansion joint at center of the run.

4. Reinforce all metal flashing corners as required. All joints must be waterproof with seam sealant.

B. Exposed Sheet Metal Work: Securely anchor sheet metal work, but allow for thermal movement and building movement. Use concealed fasteners to the greatest extent possible. Install work to be permanently weatherproof and watertight.

C. Reglets: Provide reglets where indicated and where needed to terminate membrane at vertical surfaces. Coordinate installation with related and adjacent work. Seal entire reglet with sealant as specified in Section 07920 - Sealants and Caulkings.

3.04 COMPLETION

A. All guarantees, as required in Part 1 of this specification shall be submitted for approval prior to final payment.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section, complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein..

ITEM NO.	DESCRIPTION	UNIT
0750.000	MEMBRANE ROOFING	LS

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing flashing and sheet metal work in accordance with Standard Specification Construction Section 07600, except as modified herein.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials in manufacturer's sealed containers and rolls.

B. Store indoors or under cover, on raised platforms, fully protected from damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Materials

6. Provide Type E, Lead-Coated Copper:

2.02 FABRICATION

B. General

8. Isolate dissimilar materials with isolation coating.

PART 3 - EXECUTION

3.03 INSTALLATION

H. Composite Throughwall Flashing: Provide concealed flashing at every obstruction to the downward flow of water including, but not limited to, ledges, shelf angles, lintels, door and window heads, sills, and jambs, and elsewhere as indicated or required. Form and install flashing to effectively control and divert water to the exterior.

1. Form at least 6" high pans with folded and sealed corners.
2. Extend flashing pan the entire length of the obstruction.
3. Make watertight joints and seams overlapped at least 6".
4. Extend concealed flashings from outer face of wall through the wall and turned up two inches on the inside face of the wall when the wall is concealed from view. Where the flashing would be exposed to view, terminate the flashing at the inside face of the wall just out of site.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0760.100	Sheet Metal and Flashing	Lump Sum

- END OF SECTION -

SECTION 07611

SHEET METAL ROOFING

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section specifies batten seam, sheet metal roofing, accessories, and related work, as indicated on the Drawings and specified herein.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 06100, ROUGH CARPENTRY; Tapered wood battens, plywood sheathing.
2. Section 07600, FLASHING AND SHEET METAL WORK.

1.03 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American National Standards Institute(ANSI):

58.1	Design Loads for Buildings and Other Structures

2. American Society for Testing and Materials (ASTM):

B 32	Solder Metal
D 226	Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

Manual	Architectural Sheet Metal Manual

4. United Laboratories (UL):

580	Tests for Uplift Resistance of Roof Assemblies

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide complete sheet metal roofing system, including, but not limited to, custom-fabricated metal roof pans, cleats, clips, anchors and fasteners, sheet metal flashing and drainage components related to sheet metal roofing, fascia panels, trim, underlayment, and accessories as indicated and as required for a weathertight installation.

B. Wind-Uplift Resistance: Provide custom-fabricated sheet metal roofing capable of resisting the following design negative uplift pressure. Provide clips, fasteners, and clip spacings of type indicated and with capability to sustain, without failure, a load equal to 3 times the design negative uplift pressure.

1. Design Negative Uplift Pressure: 30 psf.

C. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal roofing thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide sheet metal roofing that does not allow water infiltration to building interior, with metal flashing and connections of sheet metal roofing lapped to allow moisture to run over and off the material.

1.05 SUBMITTALS

A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. Distinguish between shop- and field-assembled work. Include the following:

1. Details for forming sheet metal roofing, including seams and dimensions.
2. Details for joining and securing sheet metal roofing, including layout of fasteners, clips, and other attachments. Include pattern of seams.
3. Details of termination points and assemblies, including fixed points.
4. Details of expansion joints, including showing direction of expansion and contraction.
5. Details of roof penetrations.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Details of the following accessory items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.

b. Roof curbs.

C. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:

1. Sheet metal roofing and attachments.
2. Roof-mounted items including penetrations, lighting fixtures, snow guards, and items mounted on roof.

D. Samples for Initial Selection: For each type of sheet metal roofing indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Roofing: 12 in. long by actual pan or panel width, including finished batten. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim and Closures: 12 in. long. Include fasteners and other exposed accessories.
3. Accessories: 12-in. long Samples for each type of accessory.
4. Snow Guards: Full-size Sample.

F. Qualification Data: For Installer and fabricator.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sheet metal roofing portable roll-forming equipment. Include reports for structural performance.

H. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Indicate how design requirements for resistance to wind loading and other performance criteria have been satisfied.

1.06 QUALITY ASSURANCE

A. Custom-Fabricated Sheet Metal Roofing Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockup of typical roof corner at eave, including gutter, fascia, and downspout as shown on Drawings; approximately 48 in. x 48 in. by full thickness, including attachments, underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Engineer in writing.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Roofing Conference: Before starting roof construction, conduct conference at Project site. Review methods and procedures related to roof construction and sheet metal roofing including, but not limited to, the following:

1. Meet with Authority, Engineer, Authority's insurer if applicable, sheet metal roofing Installer, and installers whose work interfaces with or affects sheet metal roofing including installers of roof substrates, accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to sheet metal roofing installation.
4. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations of substrate during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect sheet metal roofing.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
8. Review temporary protection requirements for sheet metal roofing during and after installation.
9. Review roof observation and repair procedures after sheet metal roofing installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal roofing, components, and other sheet metal roofing materials so as not to be damaged or deformed. Package sheet metal roofing materials for protection during transportation and handling.

B. Unload, store, and erect sheet metal roofing materials in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Store sheet metal roofing materials to ensure dryness. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage.

D. Store metal away from uncured concrete and masonry.

E. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.08 COORDINATION

A. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of substrates, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.09 WARRANTY

A. Special Installer's Warranty: Roofing Installer's warranty, on warranty form approved by Engineer, signed by Roofing Installer, in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures.
   b. Loose parts.
   c. Wrinkling or buckling.
   d. Failure to remain weathertight, including uncontrolled water leakage.
   e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including non-uniformity of color or finish.
   f. Galvanic action between sheet metal roofing and dissimilar materials.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 ROOFING SHEET METALS

A. Zinc Sheet: Electrolytic, 99 percent pure zinc alloyed with 1 percent titanium and copper. Provide zinc sheet as manufactured by one of the following, or approved equal:

1. Rheinzink Canada Ltd.
2. VM ZINC North America - Sogem USA.
3. Revere Copper Works.

B. Finish: Pre-weathered.

C. Thickness: 0.028 inch (0.70 mm), unless otherwise indicated.

1. Batten Caps: 0.031 inch (0.80 mm) thick.

2.02 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

C. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Available Products:

   a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start "HR" High Performance Roofing Underlayment.
   b. Grace, W. R. & Co.; Vycor Ultra.
   c. Henry Company; Perma-Seal PE.
   d. Metal-Fab Manufacturing, LLC; MetShield.
   e. TC MiraDRI; WIP 300HT.

D. Slip Sheet: Building paper, minimum 5 lb/100 sq. ft. (0.24 kg/sq. m), rosin sized.

2.03 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Nails for Zinc Roofing: Copper or hardware bronze, 0.109 inch minimum and not less than 7/8 inch long, barbed with large head.

C. Solder for Zinc: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.

D. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight and as recommended by roll-formed sheet metal roofing manufacturer for installation indicated.

E. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene sealant.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.04 ACCESSORIES

A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal roofing.
2. Cleats: Mechanically seamed cleats formed from the following material:

   a. Zinc Roofing: 0.31 in. thick zinc sheet.

3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-in. thick, flexible closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

2.04 FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.

B. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.

1. Lay out sheet metal roofing so cross seams, when required, are made in direction of flow with higher pans overlapping lower pans. Stagger cross seams.
2. Fold and cleat eaves and transverse seams in the shop.
3. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leakproof construction.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.

F. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

PART 3 EXECUTION

3.01 INSPECTION

A. Contractor shall inspect all surfaces, areas and other contingent construction in or to which his work is to be installed and insure himself that they are in proper condition to receive the work to be performed under this Section. The Contractor shall notify the Engineer in writing, before any work is installed, of any condition requiring correction. Failure to make such a report shall be construed as acceptance of the existing conditions and the responsibility to provide an acceptable installation.

3.02 WORKMANSHIP

A. Work shall conform to SMACNA Manual and the manufacturer's standards for the conditions of installation and fabricators and installers shall be factory trained or authorized.

3.03 INSTALLATION

A. Details of batten seam roofing, including seams, cleats, edges, rakes, flashings and other sheet metal work shall conform to SMACNA Manual.

B. Before placement of roofing, cover plywood sheathing surfaces with waterproofing underlayment laid in shingle fashion, lapped 4 in. in direction of eave. Cover roofing underlayment with smooth Kraft building paper.

C. Lower end of pans shall be folded under 3/4 in. and upper ends folded over 1/2 in. for both upper and lower pans. 3/4 in. fold in lower end of upper pan shall be hooked into lock strip 1-1/2 in. wide and attached to underlying pan.

D. Zinc cleats, 2 in. wide, shall be spaced not more than 24 inches on center along the 1-1/2 in. edge of the first pan placed, nailed to the deck with two 1-1/2 in. barbed nails driven through each cleat close to side of pan. Bottom end of cleat shall be turned over nail heads and top 1/4 in. of cleat turned down over 1-1/2 in. edge of pan to hold it in place. 1-3/4 in. side edge of next pan shall be placed alongside cleated edge of preceding pan to develop Bermuda batten seam. Fabrication of seams may be done in shop, in accordance with approved shop fabrication details.

E. At eaves, end of each pan shall be hooked over previously placed aluminum edge strip and secured with 3/4 in. loose lock. Edge strips shall be formed from sheets not more than 10 ft. - 0 in. long and ends of adjoining lengths shall be butted together. The edge strip may be formed as detailed. For connection to gutter, ends of the standing seams at the eaves may be cut and folded back, or turned down in a tapered fold and locked to the edge strip.

3.05 CLEANING

A. Roof areas shall be thoroughly cleaned and all stains and discolorations removed. Cleaning shall be performed using mild detergents or solvents only as recommended by the roofing manufacturer.

B. All work adjacent to operations under this Section shall be inspected for damage and stains and repaired or cleaned prior to the completion of work.

3.06 CLEAN-UP

A. During the progress of the work, keep premises clear of debris resulting from his operations and shall remove surplus and waste materials from the site as soon as possible.

B. Upon completion of the work, Contractor shall remove from the site all equipment and materials used on the work as well as any debris resulting from the operations.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement and payment will not be made for the work of this Section complete in place, but all costs therefore shall be included in the Contract Lump Sum Price for the work as indicated herein.

ITEM NO.	DESCRIPTION	UNIT
0761.000	Sheet Metal Roofing	Lump Sum

- END OF SECTION -

SECTION 07920

SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies furnishing and installing sealant and caulking systems in accordance with Standard Specification Construction Section 07920, except as modified herein.

1.02 QUALITY CONTROL

D. Preconstruction Sealant Test: Submit samples of materials to be used to sealant manufacturer to determine sealant compatibility, primer requirements, and to ensure that sealants will not stain materials. Include samples of stone, metal, and other components and accessories of exterior cladding work. Test in accordance with ASTM C 794 to verify what type of primers (if any) are required to ensure sealant adhesion to substrates.

1. Submit minimum of nine pieces of each type and finish of window framing member, and nine pieces of each type of stone for adhesion tests and tests that ensure no staining of exterior stone cladding materials.

2. Provide manufacturer's written report and recommendations regarding proper sealant choice and use.

1.06 WARRANTY

A. Furnish joint sealant manufacturer's written single-source performance warranty that joint sealant work will be free of defects related to workmanship or material deficiency for five years from date of Final Acceptance of the Project.

1. Provide a written warranty signed by the sealant manufacturer that joint sealant material used in exterior stone cladding materials will not stain the exterior stone for the life of the installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General Requirements

4. Before installation check each sealant for compatibility with adjacent materials and surfaces and with indicated exposures. Select sealers which are recommended by manufacturer for each application indicated. Where exposed to pedestrian or vehicular traffic, provide sealants which are non-tracking and are strong enough to withstand the traffic without damage.

5. Provide colors as selected by Engineer from manufacturer's standard and special custom colors. Where specifically requested, provide custom color matches.

B. SELF-LEVELING POLYURETHANE SEALANT: Provide two or more part, self-leveling, polyurethane based elastomeric sealant, complying with ASTM C 920, Fed. Spec. TT-S-00227E Type 1 Class A, having Shore A hardness of not less than 30 when tested according to ASTM C 920, cured modulus of elasticity at 100% elongation of not more than 150 psi when tested according to ASTM D 412, and tear resistance of not less than 50 lbs./inch when tested according to ASTM D 624.

1. Where joint surfaces contain bituminous materials, provide modified sealants which are compatible with bituminous materials encountered.

2. Provide one of the following products that meet or exceed specified requirements or equal:

   a. Pecora Urexpan NR-200.
   b. Mameco Vulkem 245 or 255.
   c. Sika 2C, SL.
   d. Sonneborn Sonolastic PvJtSt.
   e. Tremco THC 900.

3. Extent: Provide self-leveling polyurethane sealant for paving and floor joints not indicated to be sealed with another type of sealant.

C. EXTERIOR AND INTERIOR SILICONE SEALANT: Use single-component, neutral cure, medium modilus, non-staining silicone sealants for exterior and interior vertical applications in wall systems, masonry joints, concrete joints, stone joints, metal joints, and joints between metal and masonry or stone. Provide products conforming to ASTM C-920, Type M, Grade NS, Class 12.5; and with ASTM C-920, Type S, Grade NS, Class 25, and that comply with the following:

1. Tensile Strength: 100 psi.
2. Elongation: 350% Maximum.
3. Flow: 0.3 in. maximum.
4. Extent: Provide silicone sealant for all joints within the exterior wall systems.

D. INTERIOR SILICONE RUBBER SEALANT: Provide one part, silicone rubber based elastomeric sealant, complying with ASTM C 920 Type S, Class 25, Grade NS and Fed. Spec. TT-S-001543A Class A.

1. Provide mold and mildew resistant, sanitary interior type sealant.

2. Provide one of the following products that meet or exceed specified requirements or equal:

   a. Dow 786.
   b. General Electric 1702 Sanitary.
   c. Pecora 863.
   d. Rhodorsil 6b White.
   e. Sonneborn OmniPlus.
   f. Tremco Proglaze.

3. Extent: Provide silicone rubber sealant for interior joints around plumbing fixtures and tile to tile joints in ceramic tile work.

E. ACRYLIC LATEX SEALANT: Provide permanently flexible, latex rubber modified acrylic emulsion sealant, complying with ASTM C 834.

1. Provide one of following products that meet or exceed specified requirements or equal:

   a. Pecora AC-20
   b. Tremco Acrylic Latex 834
   c. Sonneborn Sonolac

2. Extent: Provide acrylic latex sealant for use at mirrors, for exposed acoustical sealant, and for interior joints except where silicone rubber sealant is indicated.

3. At interior joints greater than 1/2 in. in width or subjected to periodic building movement, substitute exterior type sealant specified above.

4. Where surrounding wall surfaces are to be left unpainted, substitute exterior type sealant as specified above.

2.03 PREFORMED JOINT SEALER

A. Preformed Resilient Joint Sealer: Preformed Resilient Joint Sealer for use at building expansion joints in exterior concrete and masonry walls where specifically called for on Drawings shall be preformed, resilient, extruded polychlorophrene elastomeric joint sealer, conforming to ASTM D 2628 and AASHTO M 220 of indicated configuration(s), in continuous lengths, set in manufacturer's recommended primer-lubricating-adhesive consisting of moisture curing polyurethane and aromatic hydrocarbon solvent mixture (73% solid by weight) concrete gray color, equal to one of the following or equal:

1. D.S. Brown Co.
2. Watson-Bowman & Acme Corp.
3. Balco

2.04 PREFORMED, PRECOMPRESSED, IMPREGNATED FOAM SEALANT

A. Provide manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; factory-produced in precompressed sizes in roll or stick form to fit joint widths indicated. Provide foam sealant permanently elastic, mildew-resistant, nonmigratory, nonstaining, compatible with substrates, and complying with the following requirements or equal:

1. Impregnating Agent: Manufacturer's standard.
2. Density: 8 - 10 lb./cu. ft.
3. Backing: Manufacturer's standard pressure sensitive adhesive, factory applied to one side, with protective wrapping.

B. Provide one of the following products, or Engineer approved equal:

1. Emseal Greyflex; Emseal Corp.
2. Will-Seal 150; Wil-Seal Construction Foams Div., Illbruck.
3. York-Seal 100; York Manufacturing, Inc.

2.05 MISCELLANEOUS MATERIALS

A. Primer: Provide primer recommended by sealant manufacturer for surfaces to be adhered to.

B. Bond Breaker Tape: Provide polyethylene or other plastic tape recommended by sealant manufacturer to prevent three-sided adhesion.

C. Backer Rod: Provide compressible rod of durable nonabsorptive material recommended by sealant manufacturer for compatibility with sealant. Provide products of one of the following manufacturers or equal:

1. Backer Rod Manufacturing and Supply Co.
2. Dow Chemical Co.
3. W. R. Meadows, Inc.
4. Williams Products, Inc.
5. Woodmont Products, Inc.

D. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foam rod in contact with one another, and each compressed to approximately 2/3 original width when in place.

E. Provide miscellaneous materials of type that will not bleed through sealant, discolor surface, or produce other deleterious effects. Select size to provide compression to approximately 2/3 original width when in place. Provide backing material profile concave to the rear of the

PART 3 - EXECUTION

3.03 APPLICATION

B. Schedule work as long as possible after completion of concrete and limestone and granite work.

C. Provide backer rods for liquid sealants except where specifically recommended against by sealant manufacturers.

D. Prevent three sided adhesion by use of bond breaker tapes or backer rods.

E. Finished sealant at exterior wall construction, including Granite, metal, etc. shall be provided in field after erection.

F. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.

G. Except in hot weather, make sealant surface slightly concave. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface. At horizontal joints form a slight cove to prevent trapping water.

H. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations.

I. General Extent: Seal joints indicated, and all interior and exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all interior and exterior control joints.

1. Provide double sealed joints at exterior locations as indicated on Drawings.

J. Exterior Sealant Schedule: Without limitation, the work of this Section includes sealing the following:

1. Masonry to masonry joints.
2. Masonry to other exterior wall materials, including metal.
3. Metal to metal joints.
4. Wood to wood and wood to metal joints.
5. Concrete to concrete joints.
6. Joints and cracks in paving and walks.
7. Joint fillers for all joints.

K. Interior Sealant Schedule: Without limitation, the work of this Section includes sealing the following:

1. Perimeters of door frames, window frames, and metal and wood frames.
2. Metal to gypsum drywall joints.
3. Top of wall base along irregular walls.
4. Between acoustical ceiling edge angle and irregular walls.
5. Tile to tile joints inside corners, tile to metal joints, and tile to gypsum drywall joints.
6. Splash to counter joints and splash to wall joints at countertops.
7. Completely around plumbing fixtures, fittings, and trim to countertops, walls and floors.
8. Exposed acoustical sealants, at tops and bottoms of stud partition walls around mechanical rooms, elevator machine rooms, toilet rooms, and at other acoustic partitions as indicated.
9. Thresholds of exterior doors shall be set in full beds of exterior sealant, not less than 3/8 in. thick. At Contractor's option, a polybutene or polyisobutylene sealant by same manufacturer may be used at thresholds.

L. Curing: Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.06 CLEANING

D. Remove smears from adjacent surfaces immediately, as the work progresses. Exercise particular care to prevent smearing or staining of surrounding surfaces which will be exposed in the finished work, and repair any damage done to same as result of this work without additional cost to Authority.

E. Remove and replace work that is damaged or deteriorated.

F. Clean adjacent surfaces using materials and methods recommended by sealant manufacturer. Remove and replace work that cannot be successfully cleaned.

G. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protection immediately before final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item of work to which they pertain.

- END OF SECTION -